MONTANA IMMUNIZATION PROGRAM

HL7 2.3.1/2.5.1 Data Exchange Specification Guide

MONTANA DPHHS
Healthy People. Healthy Communities.
Department of Public Health & Human Services

v1.3.1

August 2013

Scientific Technologies Corporation
STC

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TERMINOLOGY USED

There are many acronyms and terms used throughout this guide. Please refer to the section below:

ACIP	Advisory Committee on Immunization Practices
ACK	Acknowledgement- an HL7 message sent acknowledging receipt of message
ADIM	Application Data Immunization Manager – imMTrax message processor which includes deduplication activity.
AL	Always – Indicator in the HL7 message header to always send a response message back to the sending application.
ANSI	American National Standards Institute
Batch	An EHR can flag HL7 messages, put the messages into a queue, and then send all flagged messages in a single instance. See also Real-Time.
CDC	Centers for Disease Control and Prevention
CMS	Center for Medicaid/Medicare Services
CPT	Codes used to represent vaccines in billing systems. These are accepted by imMTrax in lieu of CVX codes or they may be sent with CVX codes.
CVX	Vaccine codes used in HL7 messages. These codes are read by imMTrax to know which vaccines were recorded.
EHR	Electronic Health Record
ERR	Error
GUI	Graphical User Interface
HIE	Health Information Exchange
HISTORICAL	Refers to vaccines that were given elsewhere but are documented in the patient's record.
HITECH	Health Information Technology for Economic and Clinical Health (Act)
HL7	Health Level 7
HTTPS	Hypertext Transfer Protocol Secure
ID	Identification
IIS	Immunization Information Systems
imMTrax	The name of Montana's immunization registry
Meaningful Use	Incentive funding provided by CMS
MVX codes	Vaccine Manufacturer Codes
NE	Never – Indicator in the HL7 message that the sending application never wants to receive an acknowledgement from imMTrax.
PHC-Hub™	Public Health Connection- Hub – STC interface tool
QBP	Query By Parameter
Real-Time	When an HL7 message is created, it sends the message immediately to the immunization registry unlike Batch.
SOAP	Simple Object Access Protocol-transport mechanism used with messages sent via web services
RSP	Response by Parameter
STC	Scientific Technologies Corporation- Montana's immunization registry software vendor

VFC	Vaccines for Children
VXQ	Vaccine Record Query
VXU	Unsolicited Vaccination Update- an HL7 message to send vaccine data
WIR	Wisconsin Immunization Registry application
WSDL	Web Service Definition Language

I. INTRODUCTION

The Montana Department of Health and Human Services Immunization Program and Scientific Technology Corporation joined together to develop the Montana Immunization Information System (IIS) known as imMTrax. imMTrax is an enhanced version of the Wisconsin Immunization Registry (WIR) system designed to meet Montana's specific needs.

imMTrax complies with the current Centers for Disease Control and Prevention (CDC) v2.3.1 and v2.5.1 HL7 Guide for Immunization Messaging. The CDC has worked with HL7 developers to create a set of messages that permit exchange of immunization data. The CDC has worked with HL7 developers from the American National Standards Institute (ANSI) whose HL7 standards are widely used for data exchange between applications in the health care industry to create the immunization message standards. A complete set of references on ANSI standards and the CDC HL7 guide for immunization data are provided in Appendix 1 of this document.

INTENDED AUDIENCE

This guide is created to assist vendors and providers who wish to electronically submit patient demographic and vaccination event information to imMTrax using HL7 messages and define how these messages should be constructed.

SCOPE AND PURPOSE

The purpose of this guide is to:

- Identify the specific HL7 message fields that imMTrax requires
- Review the accepted connectivity methods to securely submit data to imMTrax's server
- Identify the various points where HL7 immunization messages could fail before ultimately populating the imMTrax patient record with the information
- Review the Montana law that concerns patient/parent consent needed to share their immunization information with other immunization providers or those that are required to report immunization coverage information

This guide reflects the current imMTrax functionality and requirements. imMTrax and the HL7 requirements are constantly evolving. This guide will be updated periodically, as state required fields change and to ensure compliance with the CDC HL7 standards.

As with any state immunization information system, imMTrax reserves the right to require certain HL7 fields before data is allowed into the production system. These fields may be listed in the CDC HL7 guide as required, required but may be empty, or optional. The imMTrax required fields are listed in Appendix 7 of this document.

IMMTRAX OVERVIEW

imMTrax is a real time, population-based Web application that collects patient vaccination event information from various sources and consolidates them into one unduplicated record. In addition to recording vaccination information, imMTrax performs functions such as:

- Produces reports required to comply with the provider's participation in the federal Vaccines for Children (VFC) program.
- Tracks vaccine usage by provider and supports provider's ability to order VFC vaccines online.
- Identifies vaccinations given at another location (historical) as opposed to those administered at the submitting provider location.
- Forecasts when vaccinations are due or overdue according to Advisory Committee on Immunization Practice (ACIP) recommendations.
- Records contraindications to vaccination and vaccine reactions.
- Produces notices to ensure vaccines are appropriately utilized and reminds patients/parents when vaccinations are due or overdue.
- Produces extracts to allow providers and public health staff to evaluate the provider's vaccination coverage rate for their patient population.
- Supports electronic methods to import data from other applications containing patient demographic and immunization data via HL7 v2.3.1 and v2.5.1.

ELECTRONIC DATA EXCHANGE WITH IMMTRAX

Electronic Health Record (EHR) systems are software applications used by healthcare providers to record patient demographic data and record patient encounters. The Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009 and the related Meaningful Use Incentive plan requires recipients (physicians and other healthcare providers who order/administer vaccinations) to electronically report immunization data to the state IIS.[1]

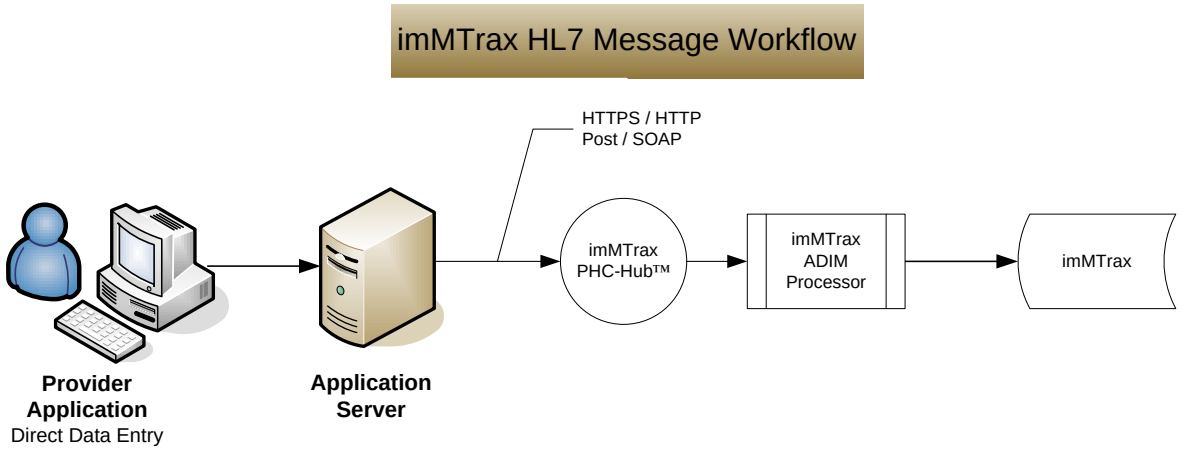
The act of changing, adding or deleting patient, next of kin or immunization data in the EHR will trigger the creation of an HL7 message. This can take place immediately (real-time) or the records can be flagged for later message creation (batch).

HL7 messages are received by the imMTrax inbound interface and processed in a two-stage manner. The first stage accepts the message content and performs field level validation in real-time as the HL7 messages are received. This is performed by PHC-Hub™. For coded fields, this includes database lookups for valid values. An ACK message is issued after this processing stage is complete.

The second stage, the ADIM processor, applies imMTrax business rules and updates the imMTrax patient and immunization data. The diagram below indicates how HL7 messages flow when sent inbound to imMTrax.

[1] HITECH Act Interim Rules; http://www.hhs.gov/ocr/privacy/hipaa/administrative/enforcementrule/hitechenforcementifr.html

imMTrax HL7 Message Workflow



II. TRANSPORT PROTOCOL

imMTrax supports the user ID and password for security (HTTP POST) or SOAP protocol to connect to PHC-Hub. Each transport option will be discussed in the sections below.

HTTPS & HTTP POST

An HL7 Immunization Registry task force (Rockmore, Yeatts, and Davidson), produced a specification titled "**Transport of Immunization HL7 transactions over the Internet Using Secure HTTP**". The imMTrax HTTP transport protocol follows this specification. The process is described as follows:

The EHR application (or other sending system) initiates the HTTP POST transaction to imMTrax with the following data fields that populate the message envelope:

- USERID – This is the imMTrax-assigned User ID.
- PASSWORD – imMTrax will assign a temporary password for the user. The password will be changed by the user to ensure it is kept confidential. The password must contain at least one number, alphabetic characters, and be at least eight characters long.
- MESSAGEDATA – The HL7 message is ASCII text. The message must begin with the character string "MSH".

The sending application will construct the HTTP transaction using the supplied values and including the actual HL7 message as the MESSAGEDATA parameter. The USERID and PASSWORD values will be used to insure the POST transaction is authentic. The imMTrax organization associated with the USERID will be used to associate the inbound message with a processing profile. Each unique site for which a message is sent must be identified within the message.

Once the message has been sent, the EHR should expect a standard acknowledgement (ACK) message in response. The ACK message is part of the single HTTP transaction and is returned over the same connection without the message envelope used for the original message. Error messages with details on why the inbound HL7 message was not successfully processed are also returned. For more information on error messages see Section IV.

Once the ACK message has been received, the next HL7 messages should represent all patients and patient vaccination activity that has occurred since the last communication with imMTrax. The process will repeat until all HL7 message activity has been sent. imMTrax can support and prefers real time HL7 messages, which in reality ranges from a few seconds to a few minutes after the event has been documented in the EHR. **NOTE:** The process or mechanism that triggers the vaccination message to be sent to imMTrax should occur within 24 hours. If messages are sent in a batch, the sending system must be set to send data to imMTrax at a time /day/cycle that imMTrax approves.

Additional detail on HTTP Post is contained in Appendix 2.

SOAP (SIMPLE OBJECT ACCESS PROTOCOL)

PHC-Hub, imMTrax's integration tool, transports HL7 messages utilizing the following elements:

- Username and password elements for authentication
- HL7Message element to transmit the actual message

SOAP and POST methods are both transported over HTTPS. All of the elements listed above are used in both SOAP and POST methods. The HL7 data are communicated differently using SOAP vs HTTP Post. The SOAP/WSDL uses the *USERNAME*, *PASSWORD*, and *HL7Message* to pass the messages whereas the HTTP POST method uses the *USERNAME*, *PASSWORD*, and *MESSAGEDATA*.

A sending application can use the SOAP transport protocol[2] to send messages to imMTrax. SOAP is an XML based protocol which consists of three parts:

- Envelope – A required element that identifies the XML document as a SOAP message.
- Header - An optional element that contains application-specific information (like authentication, payment, etc.) about the SOAP message.
- Body - A required element that contains call and response information. The Body contains the actual SOAP message intended for the ultimate endpoint of the message.

SOAP may be used over HTTPS with either simple or mutual authentication. It is the advocated method to provide web service security.

A SOAP message with the parameters needed for a search is sent to imMTrax PHC-Hub (with web services enabled). PHC-Hub then returns an XML-formatted document with the resulting data, e.g.,

[2] http://en.wikipedia.org/wiki/SOAP

patient demographic and vaccination information. The data being returned (in a standardized machine-parsable format) is then integrated directly into a third-party web site or application.

Processing Model

The SOAP processing model describes a distributed processing model, its participants, the SOAP nodes, and how a SOAP receiver processes a SOAP message. The following SOAP nodes are defined:

SOAP sender: A SOAP node that transmits a SOAP message.

SOAP receiver: A SOAP node that accepts a SOAP message.

SOAP message path: The set of SOAP nodes through which a single SOAP message passes.

Initial SOAP sender (Originator): The SOAP sender that originates a SOAP message at the starting point of a SOAP message path.

SOAP intermediary: A SOAP intermediary is both a SOAP receiver and a SOAP sender and is targetable from within a SOAP message. It processes the SOAP header blocks targeted at it and acts to forward a SOAP message towards an ultimate SOAP receiver.

Ultimate SOAP receiver: The SOAP receiver, in this case PHC-Hub, is a final destination of a SOAP message. It is responsible for processing the contents of the SOAP body and any SOAP header blocks targeted at it. In some circumstances, a SOAP message might not reach an ultimate SOAP receiver, for example because of a problem at a SOAP intermediary. An ultimate SOAP receiver cannot also be a SOAP intermediary for the same SOAP message.

Examples of SOAP messages can be found in Appendix 2 of this document. Reference documents on SOAP can be found in Appendix 1 of this document.

SECURITY

The interface needs to use the Internet public network for communication, and then the transaction must be encrypted using the HTTPS protocol.

The Montana Immunization Program has a PHC-Hub security certificate. The provider's vendor or information technology support person may need information about the certificate so that they can set their system to recognize PHC-Hub's certificate (install the certificate). Once these settings are complete the EHR will accept the PHC-Hub certificate and then be able to send their messages to the PHC-Hub web servlet. Information on the PHC-Hub certificate can be obtained by contacting MT immunization program staff at (406) 444-5580.

III. HL7 IMMUNIZATION MESSAGES

The CDC has adopted HL7 messaging as the standard for exchanging immunization data. The basic tenets of HL7 messaging are as follows:

- Message
  - The basic unit transmitted in an HL7 implementation.
- Segments
  - Messages are made up of several segments, each of which is one line of text, beginning with a three-letter code identifying the segment type.
  - Segments are logical grouping of data fields.
- Data Fields
  - Each field is a string of characters.
  - Fields in a segment may be required, conditionally required, required but can be empty, recommended, or optional.
  - A field is identified by the segment it's in and the position it occupies within the segment.
- Field Separators
  - Fields within a segment are separated by a field separator.
  - HL7 requires the pipe delimiter which appears in the message as the "|" symbol.
- Components
  - Components define the content in the field.
  - HL7 specifications define the specific order the various components must be in.
  - Some fields may be composed of multiple components. Example: An address is composed of street name and number, city, state and zip code.
  - Each component must be separated by a component separator, which is the "^" character.
- Delimiter characters
  - Special characters used to separate one composite in a segment from another, or separate one sub-composite from another.
  - Field values of composite data types are separated by this component separator, "^"
  - Components are further divided into sub-components which are separated by the sub-component separator, "&"
  - Some fields are defined to permit repetitions separated by the repetition character, "~"
  - When special characters need to be included within text data, their special interpretations are prevented by preceding them with the escape character, "\"

MESSAGE TYPES SUPPORTED BY PHC-HUB

PHC-Hub supports four message types of message segments. These include the QBP/RSP segments required for query and response messages in HL7 v2.5.1.

The segments supported are summarized in the following table:

ID	Name	VXU	ACK	QBP	RSP
MSH	Message Header	●	●	●	●
MSA	Message Acknowledgment		●		●
EVN	Event Type				
PID	Patient Identification	●			●
NK1	Next of Kin/Associated Parties	●			
PD1	Patient Additional Demographics	●			
ORC	Order Request	●			●
RXA	Vaccination (Pharmacy) Administration	●			●
RXR	Vaccination (Pharmacy) Route	●			
OBX	Observation Result	●			●
QPD	Query Parameter Definition			●	
RCP	Response Control Parameter			●	
QAK	Query Acknowledgement				●
QPD	Query Parameter Definition				●

Each message segment is detailed in Section IV and in APPENDIX 3.

VXU MESSAGE

This guide primarily focuses on the Unsolicited Vaccination Record Update (VXU^V04) message to send new or updated immunization event data (patient demographics and vaccine event details) to PHC-Hub.

The VXU message is an unsolicited vaccination record update. For the purposes of this document we will assume the application sending immunization data to PHC-Hub using HL7 messaging are EHRs used by healthcare providers. The VXU will be sent by the EHR to PHC-Hub in order to update a patient record in the imMTrax database. It should be sent anytime changes or additions to the patient's immunization record in the EHR changes. This includes when vaccinations are administered at the provider location and vaccinations given elsewhere (historical) are recorded into the patient's record.

When processing a VXU message, if the patient does not yet exist in imMTrax database, a new patient record will be created using the demographic data from the VXU message. If the patient already exists in imMTrax and this or a subsequent VXU messages contain updated demographic data, the patient record values will be updated with this new data according to the imMTrax business rules. This rule applies to next of kin and associated party records as well.

ACK MESSAGE

The ACK returns an acknowledgement message back to the sending system to indicate that the message was received. In a typical HL7 environment, a sender will assume the message was not received until it receives an ACK message. So if the receiver connection does not return an ACK message, the sender may assume there is a problem and stop sending messages.[3] For this reason imMTrax is set to ***always*** send an acknowledgement message to the sending system with detail information about the issue.

[3] http://www.corepointhealth.com/resource-center/hl7-resources/hl7-acknowledgement-ack

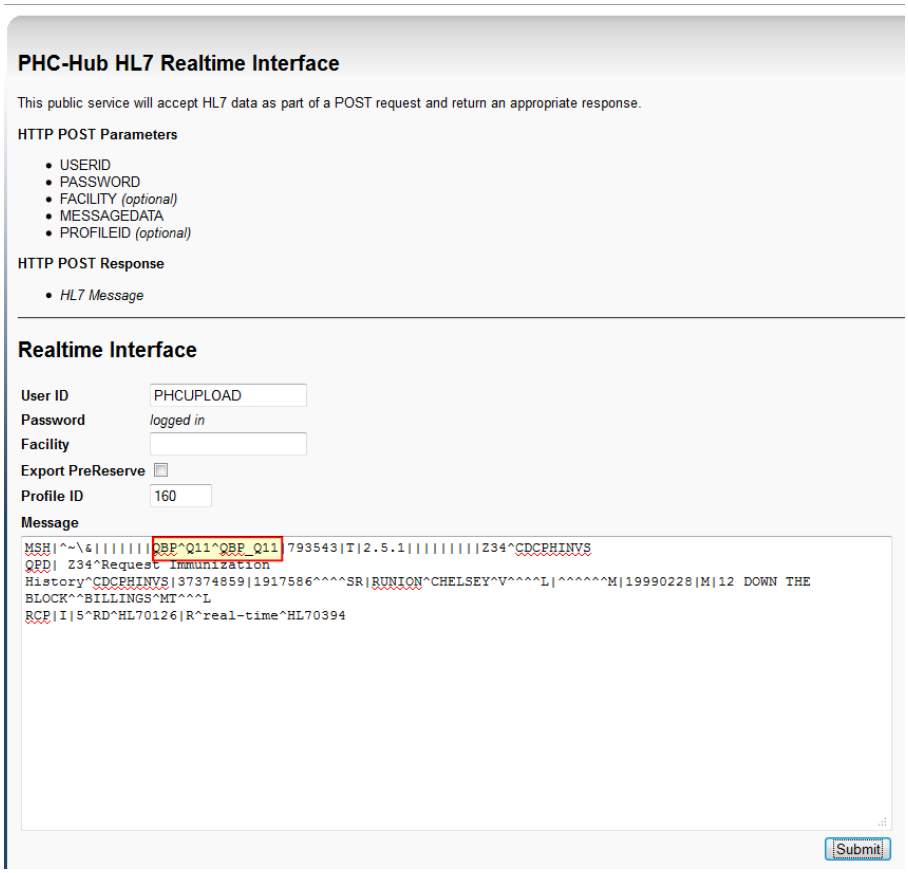
An ACK message may indicate positive information, e.g. the message was received and is being processed or negative information to indicate that there has been an error in processing the inbound message.

QBP MESSAGE

The PHC-Hub inbound query capability supports both the HL7 v2.3.1 VXQ (Vaccine Record Query) and the v2.5.1 QBP (Query By Parameter) messages. QBP messages provide a way to query a central patient information server for a list of patients based on user-defined search criteria and retrieve a patient's demographic and vaccination information directly into the sender's application.

MT immunization staff is able to set parameters within PHC-Hub that will dictate the patient and vaccination dataset that will be returned to the querying application. Only patients where exactly one high confidence candidate is found, an immunization history will be returned. In the case where no candidates are found, the response will indicate that no patients were found.

Here is an example of a QBP message being sent to PHC-Hub test utility.



RSP MESSAGE

In the PHC-Hub Export Profile, MT immunization staff have the ability to set the parameters that they will send back to the requesting system. The profile not only allows the vaccination details that will be returned but also other conditional settings. The Export Profile contains the following settings:

Vaccination Level Settings	
Send vaccination deletes	☑
Send vaccinations as historical	☐
Send contraindications	☐
Send TB indurations	☐
Send multiple birth count	☐
Send name, gender, dob from reserve record	☐
Exclude:	
Vaccinations with no CPT code	☐
Vaccinations with no CVX code	☐
Vaccinations added/updated by this HL7 account	☐
Vaccinations outside query range and not new patient	☐
Indicate vaccination given at	–select–

The response message is displayed as text on the web page. Under normal circumstances the request and response messages would be sent & received by the remote requesting system.

```
MSH|^~\&|^^|^^|^^|^^|20120703133100||RSP^K11^RSP_K11|3934572078.100000013|T|2.3.1|||||||Z32^CDCPHINVS^^|
MSA|AA|793543||
QAK|||Z34^Request Immunization History^HL70471|
QPD|Z34^Request Immunization History^HL70471|37374859|1917586^^^^SR|RUNION^CHELSEY^V^^^^L|^^^^^^M|19990228|M|12 DOWN THE BLOCK^^BI
PID|1||1917586^^^^SR~1007763^^^^MR||RUNION^CHELSEY^V^^^^L|SMITH|19990228|M||2222-2^^HL70005|15 E. CALHOUN^^Butte^MT^59701^^M~^^^M
PD1|||^^^^^^SR|1917586^^^^^^^^^^^^SR||||||02^Reminder/recall -any method^HL70215|Y|
NK1|1|RUNION^CHELSEY^V|SEL^Self^HL70063|12 DOWN THE BLOCK^^BILLINGS^MT^59101|
PV1||R|
ORC|RE|
RXA|0|999|20110615094818|20110615094818|18^rabies, intramuscular injection^CVX^90675^Rabies^CPT|1.0|mL||01^Historical information -
RXR|IM^Intramuscular^HL70162|LT^Left Thigh^HL70163|
OBX|1|CE|30963-3^Vaccine purchased with^LN||PBF^Public funds^NIP008||||||F|
OBX|1|CE|VFC-STATUS^VFC Status^STC||V07^VFC eligible - Local-specific eligibility||||||F|
ORC|RE|
RXA|0|999|20110615094941|20110615094941|23^plague^CVX^90727^Plague^CPT|1.0|mL||01^Historical information - source unspecified^NIP0
RXR|IM^Intramuscular^HL70162|LT^Left Thigh^HL70163|
OBX|1|CE|30963-3^Vaccine purchased with^LN||PBF^Public funds^NIP008||||||F|
OBX|1|CE|VFC-STATUS^VFC Status^STC||V07^VFC eligible - Local-specific eligibility||||||F|
ORC|RE|
RXA|0|999|20100201000000|20100201000000|96^TST-PPD intradermal^CVX^86580^PPD^CPT|1.0|mL||01^Historical information - source unspec
RXR|OTH^Other/Miscellaneous^HL70162|
OBX|1|DT|29768-9^date vaccine information statement published^LN||20051007000000||||||F|
OBX|1|NM|1648-5^tuberculosis reaction wheal 3D post 5 TU IDn^LN||N^Negative|MM|||||F|||20100201000000|
ORC|RE|
RXA|0|999|20100201000000|20100201000000|75^vaccinia (smallpox)^CVX|1.0|mL||01^Historical information - source unspecified^NIP001|0
RXR|OTH^Other/Miscellaneous^HL70162|
ORC|RE|
RXA|0|999|20100201000000|20100201000000|96^TST-PPD intradermal^CVX^86580^PPD^CPT|1.0|mL||01^Historical information - source unspec
RXR|OTH^Other/Miscellaneous^HL70162|
OBX|1|DT|29768-9^date vaccine information statement published^LN||20051007000000||||||F|
OBX|1|NM|1648-5^tuberculosis reaction wheal 3D post 5 TU IDn^LN||N^Negative|MM|||||F|||20100201000000|
ORC|RE|
RXA|0|999|20100201000000|20100201000000|75^vaccinia (smallpox)^CVX|1.0|mL||01^Historical information - source unspecified^NIP001|0
RXR|OTH^Other/Miscellaneous^HL70162|
```

IV. MESSAGE SEGMENT DETAILS

The following sections will outline the message segments and fields that PHC-Hub uses. Examples of complete HL7 messages are found in Appendix 3.

MSH – MESSAGE HEADER SEGMENT

The Message Header (MSH) Segment is used to define the sending application, the receiving application, the time and date the message was sent and the HL7 version the message in is among other information. The MSH segment is required. Special delimiter characters and symbols, as defined in the HL7 Message Definitions in Section IV, are used in the MSH-2 segment. The order in which these delimiters are sent in MSH-2 is critical. It must be sent as displayed in the example below or the message will not be processed by PHC-Hub.

Here is a sample MSH segment:

MSH|^~\&||MA0000||GA0000|19970901||VXU^V04|19970522MA53|P|2.3.1|||NE|AL

Field Title	Field Name	Definition
MSH-1	*Field Separator*	The character is used as the field separator for the rest of the message. Messages originated by the EHR should use the value "|"
MSH-2	*Encoding Characters*	Four characters in the following order: the component separator, the repetition separator, the escape character, and the subcomponent separator. Messages originated by the EHR should use the values "^~\&"
MSH-3	*Sending Application*	Uniquely identifies the sending application among all other applications within the network enterprise. The network enterprise consists of all the applications that participate in the exchange of HL7 messages within the enterprise. Use this field to uniquely identify the software application that is sending the HL7 message. Version number may be included.
MSH-4	*Sending Facility*	This field contains the address of the sending organization. This value is defined by the organization. This can also be used to define who is sending a query.
MSH-5	*Receiving Application*	Uniquely identifies the receiving application among all other applications within the network enterprise.
MSH-6	*Receiving Facility*	Identifies the receiving application among multiple identical applications running on behalf of different organizations. This value is defined by the sending organization.
MSH-7	*Date and Time of the*	Date/time the sending system created the message.

	Message	
MSH-9	*Message Type*	The receiving system uses this field to know the data segments to recognize and, possibly, the application to which to route this message. This identifies the type of message that is being sent. In this case, it should be set to "VXU^V04". The second component is not required on acknowledgment messages. The third component is not required for PHC-Hub.
MSH-10	*Message Control ID*	Number or other identifier that uniquely identifies the message. This identifier is unique within the scope of the sending facility (MSH.4), sending application (MSH.3), and the YYYYMMDD portion of message date (MSH.7). The receiving system echoes this ID back to the sending system in the message acknowledgment segment (MSA). The content and format of the data sent in this field is the responsibility of the sender. The receiver returns exactly what was sent in response messages.
MSH-11	*Processing ID*	Used to indicate how to process the message as defined in HL7 processing rules. The "P" must be sent whether the data is from the test or production system.
MSH-12	*Version ID*	Matched by the receiving system to its own HL7 version to be sure the message will be interpreted correctly. Either 2.3.1 or 2.5.1 is supported. If 2.5.1 is specified, field values will be treated accordingly.
MSH-15	*Accept Acknowledgment Type (ID)*	Identifies the conditions under which accept acknowledgments are required to be returned in response to this message. Accept acknowledgement indicates if the message was safely received or not. It does not indicate successful processing.
MSH-16	*Application Acknowledgment Type (ID)*	Contains the conditions the sending application sets for acknowledgments to be returned from PHC-Hub in response to this message. ***It is strongly recommended that this be set to AL for all incoming messages.*** This tells PHC-Hub to always return a response message to the sending system. This helps the sending system monitor error messages that may occur. ***Receiving Notes:*** This behavior can be overridden in the HL7 Upload Settings or Import Profile configuration in PHC-Hub if the sending application has left it blank. (If a query message is sent with NE specified, the query will be performed, but no response will be returned from PHC-Hub.)

PID – PATIENT IDENTIFICATION SEGMENT

The Patient Identification (PID) Segment is used to communicate patient identification and demographic information. The PID segment is required. The supported fields are described below.

<table>
<tr><th>Field Title</th><th>Field Name</th><th>Definition</th></tr>
<tr><td>PID-3</td><td>Patient Identifier List</td><td>This field contains the list of identifiers (one or more) used by IIS and their participants to uniquely identify a patient (e.g., medical record number, billing number, account number, etc.) The Medical Record Number identifier is intended to support the local patient identifier assigned by the entity that originated the message.

The type code should always be used to identify what type of identifier is being listed. PHC-Hub retains all identifiers and type codes they receive to help match patient records seen by multiple providers

This field repeats. PHC-Hub uses the identifier type code to determine which type of identifier is present. The table below shows the supported identifiers and their corresponding type codes. PHC-Hub expects MR or MRN to be sent.

<table>
<tr><th>ID Number</th><th>Identifier Type</th></tr>
<tr><td>Birth certificate number</td><td>BR</td></tr>
<tr><td>Medicaid number</td><td>MA</td></tr>
<tr><td>Medical record number</td><td>MR or MRN</td></tr>
</table>
</td></tr>
<tr><td>PID-5</td><td>Patient Name</td><td>The patient’s current, assumed legal name should be sent in this field. The name type code in this field should always be “L” for “Legal.” All other patient names should be sent in PID-9-patient alias. Repetition of this field is allowed only for representing the same name in different character sets, a situation that will rarely arise. Therefore, this field should be considered not repeating.

The components supported are:
Family Name (Surname subcomponent/Last Name) – name type code “L”
Given Name (First Name) – name type code “L”
Second and further given names – name type code “L”
Suffix</td></tr>
<tr><td>PID-6</td><td>Mother’s Maiden</td><td>This field contains the family name under which the mother was born (i.e., before marriage). It is used to distinguish between</td></tr>
</table>

<table>
<tr><td></td><td>Name</td><td>patients with the same last name. The name type code should be valued “M” for “Maiden Name.” If a system needs additional information about the mother, the NK1 segment should be used. This field is highly weighted for de-duplicating patients in imMTrax as public health departments cannot require a patient or parent social security number be submitted.

The component supported is Family Name (Surname subcomponent/Last Name).</td></tr>
<tr><td>PID-7</td><td>Patient Date of Birth</td><td>This field contains the patient's date and time of birth. If not present, the HHMM (Hour Minute) portion will default to 0000. The date field must be in the YYYYMMDD format.</td></tr>
<tr><td>PID-8</td><td>Patient Gender</td><td>This field is populated with the patient’s gender. This is needed to derive the correct vaccine forecasting for some vaccinations.</td></tr>
<tr><td>PID-9</td><td>Patient Alias</td><td>This field contains names by which the patient has been known at some point in time.

The components supported are: Family Name (Surname subcomponent/Last Name); Given (First Name) and Middle Name.</td></tr>
<tr><td>PID-10</td><td>Patient Race</td><td>This field identifies the patient’s race. The components supported are: Identifier, Text and name of the coding system. Although all 3 components may be present, only the Identifier Code is read by PHC-Hub.

The follow table contains the code values that PHC-Hub accepts:

<table>
<tr><th>Code</th><th>Description</th></tr>
<tr><td>2135-2</td><td>Hispanic/Latino</td></tr>
<tr><td>2028-9</td><td>Asian</td></tr>
<tr><td>2054-5</td><td>Black/African American</td></tr>
<tr><td>1002-5</td><td>American Indian/Alaska Native</td></tr>
<tr><td>2076-8</td><td>Native Hawaiian or other Pacific Islander</td></tr>
<tr><td>2106-3</td><td>White</td></tr>
<tr><td>2131-1</td><td>Other</td></tr>
<tr><td>2222-2</td><td>Unknown</td></tr>
</table>
</td></tr>
<tr><td>PID-11</td><td>Patient Address</td><td>This field lists the mailing address of the patient. Multiple addresses for the same person may be sent in the following sequence: 1) the primary mailing address; 2) if the mailing address is not sent, then a repeat delimiter must be sent in the first sequence. If there is only one repetition of this field and an address type is not given, it is assumed to be the primary</td></tr>
</table>

mailing address.

The components supported are:
1. Street Address
2. Other Designation
3. City
4. State or Province
5. Zip or Postal Code
6. Country
7 Address Type (“M”)
8. County Code

Address is a repeating field. Sub-component 7 is used to indicate what type of address is represented. For second or subsequent instances of address, if the address type is valued with “N”, the sub-components 4-state and 6-country will be extracted and stored as the patient’s birth state and country.

The county codes are from the Federal Information Processing Standards Publication 6-4 (FIPS) list of counties for each state (http://www.itl.nist.gov/fipspubs/fip6-4.htm). The codes and values that are supported are:

County Code	County Name
001	Beaverhead
003	Big Horn
005	Blaine
007	Broadwater
009	Carbon
011	Carter
013	Cascade
015	Chouteau
017	Custer
019	Daniels
021	Dawson
023	Deer Lodge
025	Fallon
027	Fergus
029	Flathead
031	Gallatin
033	Garfield
035	Glacier
037	Golden Valley
039	Granite
041	Hill
043	Jefferson
045	Judith Basin

			047	Lake
			049	Lewis and Clark
			051	Liberty
			053	Lincoln
			055	McCone
			057	Madison
			059	Meagher
			061	Mineral
			063	Missoula
			065	Musselshell
			067	Park
			069	Petroleum
			071	Phillips
			073	Pondera
			075	Powder River
			077	Powell
			079	Prairie
			081	Ravalli
			083	Richland
			085	Roosevelt
			087	Rosebud
			089	Sanders
			091	Sheridan
			093	Silver Bow
			095	Stillwater
			097	Sweet Grass
			099	Teton
			101	Toole
			103	Treasure
			105	Valley
			107	Wheatland
			109	Wibaux
			111	Yellowstone
PID-13	*Patient Home Phone Number*	This field is used to report the patient primary phone number, their fax number and their email address. The separate values are determined using the telecommunication equipment type sub-component. For email addresses, the telecommunication use code must also be present. The patient email address repeat instance must use telecommunication equipment type "NET" and telecommunication use code "INTERNET". ***Note:*** *the actual value is in component 4 instead of component 1.* All patient phone numbers are sent in this sequence with the first sequence as the patient's primary number. If the primary			

<table>
<tr><td></td><td></td><td>number is not sent, then a repeat delimiter is sent in the first sequence.

The components supported are:
1. number value
2. telecommunication use code
3. telecommunication equipment type
4. email address</td></tr>
<tr><td>PID-15</td><td>Patient's Primary Language</td><td>Patient's primary language.

The components supported are:
1. Identifier
2. Text
3. Name of Coding System

Only the languages supported will be accepted as valid values. The text and coding system components can be provided, but only the code will be validated and stored.

The languages supported and their PHC-Hub translation values are as follows:
<table>
<tr><th>HL7 code</th><th>PHC-Hub code</th></tr>
<tr><td>EN</td><td>ENGLISH</td></tr>
<tr><td>ES</td><td>SPANISH</td></tr>
<tr><td>BLU</td><td>HMONG</td></tr>
<tr><td>SO</td><td>SOMALI</td></tr>
<tr><td>FR</td><td>FRENCH</td></tr>
</table></td></tr>
<tr><td>PID-22</td><td>Patient Ethnic Group</td><td>This field defines patient ethnicity.

The components supported are:
1. Identifier 2. Text 3. Name of Coding System
Although all 3 components may be present, only the Identifier code is extracted.

The ethnic group codes supported and their PHC-Hub translation
values are as follows:
<table>
<tr><th>HL7 code</th><th>PHC-Hub code</th></tr>
<tr><td>H</td><td>Hispanic or Latino</td></tr>
<tr><td>N</td><td>Not Hispanic or Latino</td></tr>
<tr><td>U</td><td>Unknown</td></tr>
</table></td></tr>
<tr><td>PID-23</td><td>Patient Birth Location</td><td>This field gives the location of the patient's birth or the name of the facility where the patient was born.</td></tr>
<tr><td>PID-24</td><td>Multiple Birth</td><td>This field indicates whether the patient was part of a multiple birth. Valid values are "yes" or "no."</td></tr>
</table>

	Indicator	
PID-25	*Birth Order*	If the patient was part of a multiple birth, a number indicating the patient's birth order is entered in this field. This field should only be used if *PID-24-Multiple birth indicator* is valued as "yes." The expected value would be 1, 2, 3, etc. depending on the total number of children born as multiples.
PID-29	*Patient Death and Time*	This field contains the date and time at which the patient death occurred. This field should only be valued if PID-30 is valued "yes."
PID-30	*Patient Death Indicator*	This field should be populated with a "yes" if the patient is deceased.

PV1 – PATIENT VISIT SEGMENT

The PV1 segment is used to convey visit specific information. The primary use in immunization messages in previous releases was to carry information about the client's eligibility status. In HL7 v2.3.1 VFC eligibility information may be sent in PV1-20.

In v2.5.1 this information is recorded at the immunization event (dose administered) level. Use of this segment for the purpose of reporting client eligibility for a funding program at the visit level is not supported in the v2.5.1 Implementation Guide.

<table>
<tr>
<td>PV1-20</td>
<td>Patient level VFC eligibility qualifier</td>
<td>A child qualifies for the Vaccines for Children program until they reach their 19th birthday. How the patient qualifies for the VFC program must be checked and updated at every vaccination visit.

The table here displays the values that should appear in PV1-20 unless the value is being sent in an OBX messages.

The code for unknown (V00) has been eliminated from the HL7 Guide and is no longer an acceptable value. It should not be collected in the EHR, nor sent to PHC-Hub in an HL7 message.

NOTE: v2.5.1 does not support the PV1-20 segment. This value must be sent in an OBX segment.
<table>
<tr><th>VFC Eligibility</th><th>Value</th></tr>
<tr><td>Not Eligible</td><td>V01</td></tr>
<tr><td>Medicaid</td><td>V02</td></tr>
<tr><td>Not Insured</td><td>V03</td></tr>
<tr><td>American Indian or Alaska Native</td><td>V04</td></tr>
</table>
</td>
</tr>
</table>

			Underinsured	V05
			Underinsured – state supplied	V06

PD1 - PATIENT ADDITIONAL DEMOGRAPHIC SEGMENT

The patient additional demographic segment contains demographic information that is likely to change about the patient.

Field Title	Field Name	Definition
PD1-3	*Patient Primary Facility*	This field contains the name and identifier that specifies the primary care facility for the patient. The first instance is the only instance supported and will always represent the facility identifier assigned by the sending system (remote). The identifier type in sub-component 7 should NOT be specified. The components supported are: Provider site name and Provider site identifier.
PD1-4	*Patient Primary Care Provider Name and Identification Number*	This field contains the provider name and ID of the identified primary care provider. This field is allowed to repeat and can provide multiple names for the same person. PHC-Hub uses this field to indicate a patient's primary care provider or medical home provider. The first repeat instance is used to extract the provider name. A second instance or third can be used to extract the identifier assigned by PHC-Hub. The sub-component 13 – Identifier type code must NOT be specified for the first repeat instance. The components supported for this first repeat instance are: ID number (remote - assigned by entity sending the message) Family name Given name Second and further given names (middle) Suffix Prefix

PD1-12	*Protection Indicator*	PHC-Hub uses this field to indicate whether or not the patient or legal guardian has given consent for imMTrax to share their data with other imMTrax users. It can have 3 values in HL7 v2.3.1: 1) Null, designated by " ", indicates that patient/guardian has not yet been asked to give consent to share or has not responded; 2) Y - sharing is allowed (patient has given consent); 3) N - sharing is not allowed (patient has refused to give consent). The suggested default value for this field is null ("") to indicate that consent has not yet been requested or received. ***The meaning of "Y" and "N" was reversed in the 2.5.1 version of the CDC guide. The inbound interface will look at MSH.12 to determine how to interpret the value. If MSH.12 contains the value "2.3.1" then "Y" means the patient has given consent. If MSH.12 contains the value "2.5.1" then "Y" means the patient has denied consent to share their data.*** Please see APPENDIX 5 for more information.
PD1-13	*Protection Indicator Effective Date*	This field indicates the date the imMTrax consent was collected from the parent or patient and reported in PD1-12. The data format for this field is YYYYMMDD.

NK1 – NEXT OF KIN/ASSOCIATED PARTIES SEGMENT

The Next of Kin (NK1)/Associated Parties Segment contains information about the patient's next of kin and other related parties. This segment is ***Highly Recommended*** for minors under age 19 yrs. Supported fields are described below.

In order for a next of kin record to be accepted into imMTrax *as a responsible person record, both a valid last name and address must be present.*

Field Title	Field Name	Definition
NK1-2	*Name*	This field gives the name of the next of kin or associated party. Multiple names for the same person are allowed, but the legal name must be sent in the first sequence. If the legal name is not sent, then the repeat delimiter must be sent in the first sequence. The components supported are: Family Name (Surname subcomponent/Last Name)

<table>
<tr><td></td><td></td><td>Given Name (First Name)
Second and further given names

This field is used in combination with the patient name and date of birth is used to deduplication minor patients in imMTrax. Public Health cannot require that the parent report the patient's Social Security number. The three fields mentioned above with the patient's name and date of birth are the most heavily weighted to de-duplicate patients in imMTrax.</td></tr>
<tr><td>NK1-3</td><td>Relationship</td><td>This field defines the relationship of the next of kin to the patient. User-defined Table 0063 -Relationship gives suggested values as defined in HL7 Standard Version 2.4.

The components supported are:
1. Identifier
2. Text
3. Name of Coding System

<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>BRO</td><td>Brother</td></tr>
<tr><td>DOM</td><td>Life Partner</td></tr>
<tr><td>EMC</td><td>Emergency Contact</td></tr>
<tr><td>EXF</td><td>Extended Family</td></tr>
<tr><td>FTH</td><td>Father</td></tr>
<tr><td>GRD</td><td>Guardian</td></tr>
<tr><td>GRP</td><td>Grandparent</td></tr>
<tr><td>MTH</td><td>Mother</td></tr>
<tr><td>OAD</td><td>Other Adult</td></tr>
<tr><td>PAR</td><td>Parent</td></tr>
<tr><td>SEL</td><td>Self</td></tr>
<tr><td>SIS</td><td>Sister</td></tr>
<tr><td>SPO</td><td>Spouse</td></tr>
<tr><td>UNK</td><td>Unknown</td></tr>
</table>

PHC-Hub strongly discourages the use of the UNKNOWN value.</td></tr>
</table>

NK1-4	*Address*	This field is the mailing address of the next of kin/associated party. Multiple addresses for the same person may be sent in the following sequence: the primary mailing address must be sent first in the sequence; if the mailing address is not sent, then a repeat delimiter must be sent in the first sequence. Only one repeat address instance is supported. If there is only one repetition of this field and an address type is not given, it is assumed to be the primary mailing address. We recommend using the USPS format for recording street address, other designation, city, state, and zip or postal code (available at <www.usps.gov>). The appropriate type code must be indicated for each address. The components supported are: 1. Street Address 2. Other Designation 3. City 4. State or Province 5. Zip or Postal Code 7. Address Type 8. County Code
NK1-5	*Phone number*	The field is for the next of kin/associated party's personal phone numbers. All personal phone numbers for the next of kin/associated party are sent in this sequence. The first sequence is considered the primary number. If the primary number is not sent, then a repeat delimiter is sent in the first sequence. The components supported are: 1. number value 2. telecommunication use code 3. telecommunication equipment type – PH (phone), FX (fax), NET (email) 4. email address
NK1-20	*Primary language*	Next of kin's primary language. Only the languages supported by PHC-Hub will be accepted as valid values. The text and coding system components can be provided, but only the code will be validated and stored. The languages supported and their PHC-Hub translation values are as follows:

<table>
<tr><td></td><td></td><td></td><td>
<table>
<tr><th>HL7 code</th><th>PHC-Hub code</th></tr>
<tr><td>EN</td><td>ENGLISH</td></tr>
<tr><td>ES</td><td>SPANISH</td></tr>
<tr><td>BLU</td><td>HMONG</td></tr>
<tr><td>SO</td><td>SOMALI</td></tr>
<tr><td>FR</td><td>FRENCH</td></tr>
</table>
</td></tr>
<tr><td>NK1-29</td><td>Contact Reason</td><td>This field identifies the role the next of kin/associated party with respect to the patient. PHC-Hub uses this field to indicate the next of kin/associated party who is designated to receive reminder/recall notices. Only the identifier code is extracted.

The components supported are:
1. Identifier 2. Text 3. Name of Coding System

The Contact Reasons supported and their PHC-Hub translation values are:
<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>RR</td><td>NK1 is reminder/recall contact for PHC-Hub</td></tr>
<tr><td>PC</td><td>NK1 is responsible for patient care</td></tr>
</table>
</td></tr>
</table>

ORC – COMMON ORDER SEGMENT

The Common Order segment (ORC) is used to indicate the medical professional that ordered a vaccination or set of vaccinations on a given day for a patient. The medical professional that ordered a vaccination may be different from the patient's primary care provider. While the "ordering" professional is specified in the ORC segment the patient's primary care provider is identified in the PD1 segment.

<u>The ordering provider field ORC-12 is supported by imMTrax at this time. The ORC segment is not required for v2.3.1 messages.</u>

The inbound interface will process the ORC segment data in v2.5.1 messages data if it is present but it is not required.

Field Title	Field Name	Definition
ORC 12	*Ordering Provider (XCN) 00226*	This field contains the identity of the person who is responsible for creating the request (i.e., ordering physician). In the case where this segment is associated with a historic immunization record and the ordering provider is not known, then this field should not be populated. This field is required to be sent but may be empty for v2.5.1 messages.

		PHC-hub supports this field for inbound VXU messages and for outbound Reciprocal batch and Query response messages. The sub-components supported are: 1. ID Number 2. Family Name 3. Given Name 4. Second and Further Given Names or Initials Thereof 5. Suffix 6. Prefix

RXA - PHARMACY/TREATMENT ADMINISTRATION SEGMENT

The Pharmacy/Treatment Administration (RXA) segment carries pharmacy administration data. It is a repeating segment in the VXU message and can record an unlimited number of vaccinations. The RXA segment is required. The supported fields are described below.

Field Title	Field Name	Definition
RXA-2	*Administration Sub-ID Counter*	Definition: This field is used to track multiple RXA under an ORC. Since each ORC has only one RXA in immunization messages, constrain to 1. This should not be used for indicating dose number, which belongs in an OBX.
RXA-3	*Date of Administration*	This field is used to indicate the vaccination date.
RXA-5	*Administered Code*	This field identifies the medical substance administered – in this case the vaccine. A CVX code should be used in the first triplet to code this field. The second set of three components is used to represent the same vaccine using CPT codes. CVX codes are preferred but CPT codes may be sent. Both CVX and CPT can be accepted. The codes are validated against a list of valid codes in PHC-Hub. An error is generated if the CVX and CPT code do not match. The components supported are: 1. Identifier 2. Text 3. Name of Coding System Only the identifier code is read by PHC-Hub. A complete list of active vaccine CVX codes can be found at: http://www2a.cdc.gov/vaccines/IIS/IISStandards/vaccines.asp?rpt=cvx

		A complete set of vaccine CPT codes cross referenced to CVX codes can be found at: http://www2a.cdc.gov/vaccines/IIS/IISStandards/vaccines.asp?rpt=cpt
RXA-6	*Administered Amount*	This field records the amount of vaccine administered. The typical value is 0.5 or 1.0. The units are expressed in the next field, RXA-7.
RXA-7	*Administered Units*	This field is conditional because it is required if the administered amount is populated in RXA-6. The typical value for the unit is ml (milliliters) or cc (cubic millimeter).
RXA-9	*Administration Notes*	Free text notes from the provider administering the medication. PHC-Hub uses this field to identify if the sending facility or site was the location that administered the vaccine (new) or the location that recorded a vaccination given elsewhere (historical). The term NEW in this usage means the vaccine was administered at the provider site who is submitting the vaccination information in the HL7 message. The term HISTORICAL means that the vaccination information reported in the HL7 message was taken from an authentic vaccination record and it contains information about vaccination(s) received at another location. *Note:* Vaccination history should only be recorded from a provider validated vaccination record. Vaccinations that a patient or parent reports from memory should not be sent to PHC-Hub. These values are represented in a code: 00 (new) or 01 (historical). Both a coded value and a free text value can be sent with the code.
RXA-10	*Administering Provider*	This field is intended to contain the name and provider ID of the person administered the vaccine which should be listed first. If the provider who ordered the vaccine if sent second. These person's names should be sent with a unique ID number. If the ID is not sent it can be mapped in PHC-Hub. (Note: The person identified by this code may be the same person listed in ORC-12, Orderer, for those systems that use the ORC segment); *The Identifier Type code in subcomponent 13 should be set to "SR" in order for the remote system ID to be extracted correctly;* Use identifier type code = "PI" to specify the PHC-Hub identifier code assigned to the physician.
RXA-11	*Administered-at Location*	This field is the name of the facility where vaccine was administered; The facility ID is populated in RXA11-4. The ID sent in the message can be one that the sending entity uses or the ID in the PHC-Hub system. If the facility name alone is sent in RXA-11, PHC-Hub can map the facility

<table>
<tr><td></td><td></td><td>name to the correct PHC-Hub ID number.

The facility address may also be included but is not required.

Note: When reporting the Historical vaccinations the facility reported in RXA-11 should be the facility or site that is reporting/sending the vaccination to PHC-Hub. It should NOT be the place where the vaccination was originally administered. PHC-Hub has logic to process these vaccinations and will preserve in the patient's record the information that is most complete.</td></tr>
<tr><td>RXA-15</td><td>Substance Lot Number</td><td>This field records the lot number for administered vaccine. NOTE: The vaccine lot number should be reported, not that of the diluent.

Lot numbers are not expected for historical vaccinations.</td></tr>
<tr><td>RXA-16</td><td>Substance Expiration Date</td><td>This field identifies the expiration date of the administered vaccine. This should be reported in YYYYMMDD format.</td></tr>
<tr><td>RXA-17</td><td>Substance Manufacturer</td><td>This field records the vaccine manufacturer for administered vaccines. This is sent as an MVX code. The name may be included but is not required. Only valid MVX codes will be accepted for administered vaccinations.

A complete list of MVX codes can be found at:
http://www2a.cdc.gov/vaccines/IIS/IISStandards/vaccines.asp?rpt=mvx

MVX codes are not expected for historical vaccinations.</td></tr>
<tr><td>RXA-18</td><td>Substance Refusal Reason</td><td>This field records the reason the patient (or the parent in cases of a child under age 18 yrs.) refused the vaccine. Any entry in the field indicates that the patient did not receive/take the substance.

If the vaccination is refused by the patient or guardian, this field will record the vaccine refusal reason. Only the code is read by PHC-Hub.

Substance refusal reason codes accepted are:

<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>00</td><td>Parental decision</td></tr>
<tr><td>01</td><td>Religious exemption</td></tr>
<tr><td>02</td><td>Other (must add text component of the CE field with description)</td></tr>
<tr><td>03</td><td>Patient decision</td></tr>
</table>

Medical contraindications and immunities to disease are recorded in OBX segments – NOT in this field.</td></tr>
</table>

<table>
<tr>
<td>RXA-19</td>
<td>Indication</td>
<td>This field contains the identifier of the condition or problem for which the drug/treatment was prescribed. Only valid codes are read by PHC-Hub. This field is OPTIONAL for PHC-Hub submissions.

Valid codes are from the table below:

<table>
<tr><th>Adverse reaction code</th><th>Description</th></tr>
<tr><td>10</td><td>Anaphylaxis or anaphylactic shock</td></tr>
<tr><td>HYPOTON</td><td>Hypotonic – hyper-responsive collapse within 48 hours</td></tr>
<tr><td>L</td><td>Life threatening illness</td></tr>
<tr><td>CRYING</td><td>Persistent crying lasting ≥ 3 hours within 48 hours</td></tr>
<tr><td>PERTCONT</td><td>Pertussis contraindication and precautions</td></tr>
<tr><td>E</td><td>Required Emergency Room or Doctors visit</td></tr>
<tr><td>ERVISIT</td><td>Required Emergency Room or Doctors visit</td></tr>
<tr><td>H</td><td>Required hospitalization</td></tr>
<tr><td>J</td><td>Resulted in permanent disability</td></tr>
<tr><td>P</td><td>Resulted in prolongation of hospitalization</td></tr>
<tr><td>SEIZURE</td><td>Seizure occurring within 3 days</td></tr>
<tr><td>FEVER105</td><td>Temperature >= 105 (40.5C) within 48 hours</td></tr>
<tr><td>TETCONT</td><td>Tetanus contraindication - allergic reaction</td></tr>
<tr><td>D</td><td>Death</td></tr>
</table>
</td>
</tr>
<tr>
<td>RXA-20</td>
<td>Completion Status</td>
<td>This field indicates the status of the vaccination administration event. If the vaccination is refused, RXA-18 should also be populated with a reason for refusal.

If the substance is not administered because it was contraindicated, an OBX segment should be populated to record the specific contraindication.

The valid codes for this field are:

<table>
<tr><th>Value Code</th><th>Description</th></tr>
<tr><td>CP</td><td>Complete</td></tr>
<tr><td>RE</td><td>Refused</td></tr>
<tr><td>NA</td><td>Not Administered</td></tr>
<tr><td>PA</td><td>Partially Administered</td></tr>
</table>
</td>
</tr>
<tr>
<td>RXA-</td>
<td>Action Code</td>
<td>This field indicates the status of the vaccination record. This field allows a method to correct vaccination information previously</td>
</tr>
</table>

<table>
<tr><td>21</td><td></td><td>transmitted. When a vaccination is sent, the action code is “Add” to the patient record. If the vaccination has been deleted or corrected in the sending system (EHR), then a deletion code (“D”) or an update code (“U”) is sent with the new vaccination information in RXA-21.

PHC-Hub will accept the deletion code in an HL7 message. When this occurs however an activity is generated. MT immunization staff will be contacting the provider to further verify that the vaccination was not completed. To correct a deleted vaccination the provider will be directed to manually change or delete a vaccination in imMTrax. PHC-Hub does not allow any electronic messaging to automatically delete vaccinations from a patient record.
The valid codes are:

<table><tr><th>Value</th><th>Description</th></tr><tr><td>A</td><td>Add</td></tr><tr><td>D</td><td>Delete</td></tr><tr><td>U</td><td>Update</td></tr></table>
The expectation is that the provider will manually go into imMTrax and fix any changes or deletions from what was sent in the original message.</td></tr>
<tr><td>RXA-22</td><td>System Entry Date/Time</td><td>This field records the date/time the vaccine information was entered into the sending system (EHR). Under usual circumstances, this field would be provided automatically by the EHR system.

This data is sent in the YYYYMMDDHHMM format.</td></tr>
</table>

RXR - PHARMACY/TREATMENT ROUTE SEGMENT

The Pharmacy/Treatment Route (RXR) Segment contains the actual route and site where the vaccination was given on the patient’s body. This segment is optional. If this segment is supplied it should immediately follow the corresponding RXA segment for the corresponding immunization.

<table>
<tr><th>Field Title</th><th>Field Name</th><th>Definition</th></tr>
<tr><td>RXR-1</td><td>Administration Route</td><td>This field is the route of administration (e.g., intramuscular, oral, etc.).
Only the identifier code is read by PHC-Hub.

The following codes are accepted by PHC-Hub.
<table><tr><th>Code</th><th>Description</th></tr><tr><td>ID</td><td>Intra-Dermal</td></tr><tr><td>IM</td><td>Intramuscular</td></tr></table></td></tr>
</table>

<table>
<tr><td></td><td></td><td></td><td><table>
<tr><td>IN</td><td>Intranasal</td></tr>
<tr><td>PO</td><td>Oral</td></tr>
<tr><td>SC</td><td>Subcutaneous</td></tr>
<tr><td>OTH</td><td>Other</td></tr>
</table></td></tr>
<tr><td>RXR-2</td><td>Administration Site</td><td>This field contains the site of the administration route (e.g., left arm, right leg). Only the identifier is read by PHC-Hub.

The following codes are accepted by PHC-Hub.<table>
<tr><th>Code</th><th>Description</th></tr>
<tr><td>LT</td><td>Left Leg</td></tr>
<tr><td>O</td><td>Mouth</td></tr>
<tr><td>N</td><td>Nose</td></tr>
<tr><td>RA</td><td>Right Arm</td></tr>
<tr><td>RT</td><td>Right Leg</td></tr>
<tr><td>LA</td><td>Left Arm</td></tr>
<tr><td>OTH</td><td>Other</td></tr>
</table></td></tr>
</table>

OBX - OBSERVATION/RESULT SEGMENT

The Observation/Result (OBX) Segment is used to transmit additional information about the vaccination event. Multiple OBX segments can be sent for one vaccination. For immunization data, the segment can be used to report adverse advents, allergic reactions, or public/private indicators for vaccine lot numbers. The OBX segment is optional. When present, the fields identified below are supported.

Field Title	Field Name	Definition
OBX-1	*Set ID OBX (SI) 00569*	This field contains a sequence number since multiple observations can be sent for a single RXA. In this example "1" indicates that this is the first of multiple OBX segments sent: OBX|1|CE|64994-7^Vaccine purchased with^LN||PBF^Public funds^NIP008|||||F|
OBX-2	*Value Type (ID) 00570*	This field contains the data type which defines the format of the observation value in OBX-5. In this example, "CE" is the format that is sent: OBX|1|CE|64994-7^Vaccine purchased with^LN||PBF^Public funds^NIP008|||||F|

OBX-3	*Observation Identifier (CE) 00571*	This field contains a unique identifier for the observation. The format is that of the Coded Element (CE). Observations in VXU messages are used to include additional information that is not currently supported by RXA or RXR segments. These extra values have specific identifiers that must be set properly in order for PHC-Hub to recognize them. The 2.3.1 Implementation Guide used suffixes on the first sequence in OBX-3 to group related observations. For instance, reporting a VIS publication date and VIS receipt date, each added a suffix of one LOINC code to a second LOINC code when recording VIS dates for a component vaccine. (38890-0&29768-9^DATE VACCINE INFORMATION STATEMENT PUBLISHED^LN). This is no longer acceptable. Grouping of related observations will be accomplished using Observation sub-id (OBX-4). Additional information can be found online at: http://www.cdc.gov/vaccines/programs/iis/technical-guidance/downloads/hl7guide-1-4-2012-08.pdf, pg. 108 The values supported for inbound VXU messages are:

OBX IDENTIFIER #	DESCRIPTION
64994-7	Vaccine funding Program eligibility category
30963-3	Vaccine funding source
30956-7	Vaccine type that the VIS statement provided information about
29768-9	VIS publication date
69764-9	Document type that the statement provides information about, e.g. barcode
38890-0	Vaccine component type such as “unspecified.”
29769-7	Date the document was presented to the patient or responsible person
30945-0	Contraindication
30946-8	Vaccination contraindication/precaution effective data.
30944-3	Vaccination temporary contraindication /precaution expiration date

<table>
<tr><td></td><td></td><td>
<table>
<tr><td>31044-1</td><td>Reaction to vaccination</td></tr>
<tr><td>59784-9</td><td>Disease with presumed immunity</td></tr>
<tr><td>59784-6</td><td>Indications to immunize</td></tr>
</table>
Example:
OBX|1|CE|30963-3^Vaccine purchased with^LN||PBF^Public funds^NIP008|||||F|
</td></tr>
<tr><td>OBX-5</td><td>Observation Value (varies) 00573</td><td>This field provides a value for the observation type specified in OBX-3. An observation value is represented as the data type specified in OBX-2-value type of the same segment. PHC-Hub can track Vaccines for Children (VFC) immunization administrations and vaccine lot inventory for providers. In v2.3.1 messages the patient level VFC eligibility information may be sent in either PV1-20 or an OBX segment. In v2.5.1, the patient level VFC eligibility information MUST be sent in an OBX segment. PV1-20 will no longer be recognized in v2.5.1 messages.
The following information may be reported in OBX-5 to support this functionality:

• Vaccine Lot Number -OR-
• Vaccine Manufacturer -OR-
• Facility/Clinic Id -OR-
• Patient VFC Status at time of vaccine given -OR-
• Vaccine Publicly Supplied

The following examples demonstrates values that are correct in OBX-5:
OBX|1|CE|30963-3^Vaccine purchased with^LN||PBF^Public funds^NIP008|||||F|||20090531

OBX|2|CE|VFC-STATUS^VFC Status^STC||V02^Medicaid^HL70064|||||F|||20090531

OBX|3|TS|29768-9^Date Vaccine Information Statement Published^LN|1|20080101|||||F|||20090531

OBX|4|TS|29769-7^Date Vaccine Information Statement Vaccine Information Statement Presented^LN|1|20090531|||||F|||20090531</td></tr>
<tr><td>OBX-11</td><td>Observation Result Status (ID) 00579</td><td>This field should contain the value “F”, which designates the observation as “Final”. See the example below highlighted in yellow:
OBX|2|CE|VFC-STATUS^VFC Status^STC||V02|||||F|</td></tr>
</table>

OBX-14	*Date/Time of the Observation (TS) 00582*	This field will be populated for a TB test results OBX and for items with a publication date such as the Vaccine Information Statement (VIS). See the example below highlighted in yellow: OBX|3|TS|29768-9^DATE VACCINE INFORMATION STATEMENT PUBLISHED^LN|1|19950520 1420|||||F|||20100920

V. HL7 MESSAGE RESPONSES

There are two types of basic responses that an application sending data to PHC-Hub can expect in return:

1. A positive acknowledgement or an ACK
2. An ERR message indicating an error has occurred.

Error messages are accompanied by a reason that the error occurred. To follow is more information about the response types that can be received from PHC-Hub and what they mean.

ACK - GENERAL ACKNOWLEDGMENT MESSAGE

For the EHR interface to PHC-Hub, the ACK message is used to signal an application level acknowledgement. Messages are processed by imMTrax in 2 stages. The first stage commits the message content and performs field level validation. For coded fields, the database is checking to ensure the values sent are valid in PHC-Hub. An ACK message is issued after this processing stage is complete.

The second stage is completed in imMTrax's processor known as ADIM. ADIM applies business rules and updates the imMTrax patient and immunization data.

MSH – MESSAGE HEADER SEGMENT

Message Header Segments (MSH) can indicate if they want to receive acknowledgements or error messages. The choice is to always receive acknowledgments, receive messages on when there is an error or never. ***PHC-Hub strongly recommends that this be set to AL for all incoming messages.*** This tells PHC-Hub to always return a response message to the sending system. It is essential to the sending system so errors can be monitored and corrected. The indicator is found in MSH segment 16.

The values are:
AL – Always
ERR – When Errors occur
NE- Never

In the example below, the EPIC system is sending PHC-Hub an indication that they want to receive return messages only when the message errors.

MSH|^~|&|EPIC|PHC-Hub |PHC-Hub||20090604||ACK^V04^ACK|9299381|P|2.5.1|||AL<CR>

A full description of the MSH segment can be found in at the beginning of this Section.

MSA - MESSAGE ACKNOWLEDGMENT SEGMENT

The MSA segment is used to identify the other HL7 message being acknowledged and to specify the acknowledgement status.

<table>
<tr><th>Field Title</th><th>Field Name</th><th>Definition</th></tr>
<tr><td>MSA-1</td><td>Acknowledgment Code</td><td>This field contains an acknowledgment code. PHC-Hub will issue Original mode acknowledgement codes or in other words it mirrors the MSH segment found in the original message[4]. If the MSH segment of the VXU message contains a value in MSH.16 - application acknowledgement type, then the ACK message returned will use the CA type response. If no value is received in MSH.16, then the AA type is used.
The codes that PHC-Hub supports to acceptance are in the table below.
<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>AA</td><td>Original mode: Application Accept
Enhanced mode: Application acknowledgment: Accept</td></tr>
<tr><td>CA</td><td>Enhanced mode: Accept acknowledgment:
Commit Accept</td></tr>
</table>
</td></tr>
<tr><td>MSA-3</td><td>Text Message</td><td>Text field that further describes an error condition. This text may be printed in error logs or presented to an end user.

This example shows that this message generated an error because the patient race code was missing (it was a required field).

MSH|^~\&|PHC-Hub^^|^^|PRIMESUITE^^|Valley Physicians Inc^^|20130609155515||ACK^|5630793266.100014778|P|2.3.1|
MSA|AE|Valley Physicians Inc-6178|Facility ID is missing|||^^HL70357|ERR|^^0^^^HL70357|</td></tr>
</table>

[4] HL7 Standards website: http://www.hl7standards.com/blog/2011/01/18/hl7-acknowledgements-and-interface-pacing/

ERR - ERROR SEGMENT

This segment is used to add error comments to acknowledgment messages. If the message was rejected for functional reasons, this segment will locate the error and describe it using locally established codes.

ERR-1 Error Code and Location

Identifies an erroneous segment in the message received. When required fields are missing, the error messages returned will include messages about the messages segments involved.
In the example message below, the PID-5 (patient name) field is missing. Since PID-5 is a required field in a PID, the PID is ignored and therefore is missing.

MSH|^~|&|DCS|MYIIS|MYIIS||20090604||ACK^V04^ACK|9299381|P|2.5.1|||ER<CR>
MSA|AR|9299381<CR>
ERR||PID^5|101^required field missing^HL70357|E<CR>
ERR||PID|100^required segment missing^HL70357|E<CR>

A critical error that does not allow the message to be processed at all will be sent a processing error. These are usually missing or misplaced items in the message header or those that prevent PHC-Hub from knowing what location is sending the message. The example below shows the error message that will be returned to the sending system in these cases.

MSH|^~|&|PHC-Hub|MYIIS|MYIIS||20090604||ACK^V04^ACK|9299381|P|2.5.1|||ER<CR>
MSA|AE|20090604|Processing error prevented the completion of this request: Unable to validate|||207^^HL70357|
ERR|||^^^207^^HL703571

VI. APPENDICES

APPENDIX 1 – REFERENCES

The Montana Immunization Program supports the Center for Disease Control's National Immunization Program (NIP) and the American Immunization Registry Association's (AIRA) goal to use HL7 for immunization data in a uniform manner.

imMTrax's HL7 specification guide should be used in conjunction with the following documents:
CDC's *Implementation Guide for Immunization Data Transactions using Version 2.3.1 of the Health Level Seven (HL7) Standard Protocol,* published as version 2.2 in June 2006:
http://www.cdc.gov/vaccines/programs/iis/technical-guidance/downloads/hl7guide.pdf

CDC's Implementation Guide for Immunization Messaging Version 2.5.1, January 2012:
http://www.cdc.gov/vaccines/programs/iis/technical-guidance/downloads/hl7guide-1-4-2012-08.pdf

CDC Implementation Guide for Immunization Messaging Version 2.5.1 as it applied to inbound unsolicited VXU messages: *http://www.cdc.gov/vaccines/programs/iis/technical.guidance/hl7.html*

National Vaccine Advisory Committee 2013-2017 Recommendations For The Core Data Elements Supported In An IIS (Last Updated In December 2012): *http://www.cdc.gov/vaccines/programs/iis/func-stds.html#appB*

CDC's IIS HL7 Standard Code Set – Manufacturers of Vaccines (MVX):
http://www2a.cdc.gov/vaccines/IIS/IISStandards/vaccines.asp?rpt=mvx

CDC's IIS HL7 Standard Code Set – Vaccine Codes (CVX):
http://www2a.cdc.gov/vaccines/IIS/IISStandards/vaccines.asp?rpt=cvx

CDC's CPT mapped to CVX codes (for vaccines):
http://www2a.cdc.gov/vaccines/IIS/IISStandards/vaccines.asp?rpt=cpt

CDC's HL7 Standard Code set – mapping vaccine product names to MVX and CVX codes:
http://www2a.cdc.gov/vaccines/IIS/IISStandards/vaccines.asp?rpt=tradename

CDC's Technical Guide on SOAP Transport specifications: *http://www.cdc.gov/vaccines/programs/iis/technical-guidance/SOAP/downloads/transport-specification.pdf*

CDC's Technical Guide on SOAP WSDL: *http://www.cdc.gov/vaccines/programs/iis/technical-guidance/SOAP/wsdl.html*

APPENDIX 2 – HL7 MESSAGE TRANSPORT TO PHC-HUB

This appendix is a copy of the document "*Transport of Immunization HL7 transactions over the Internet Using Secure HTTP*" Version 1.0, September 17, 2002. Authored by The HL7 Immunization Registry Task Force sub group on HTTP message transport (Joseph Rockmore – IBM Corporation, Andrey Yeatts – Scientific Technologies Corporation, Kevin Davidson – QS Technologies, Inc).

This document discusses conventions that may be used to transport Health Level Seven (HL7) messages over the Internet using Secure HTTP (HTTPS). It is the intent of sub group to use existing standards wherever possible.

PRIVACY

When transporting identifiable health information, the privacy of the information must be insured. Privacy may be insured by encrypting the message or transmitting the message over a secure channel. The HTTPS protocol, widely used for secure transactions in eCommerce, provides encryption and is recommended by this standard. The HTTPS protocol is defined in RFC 2660 (*http://www.ietf.org/rfc/rfc2660.txt*);

AUTHENTICATION

Health information messages state important facts about personal information. Because of this, it is necessary to provide assurance of the identity of party asserting the facts in these messages. Authentication provides such assurance.

Two authentication methods are proposed.

1. User Name/Password. imMTtrax provides each of its clients (other immunization registries and data providers) a User ID and a temporary password. The client will need to login and change the temporary password to a password only the client knows. The client present this User ID and password whenever sending transactions.
2. The HL7 message will be digitally signed using X.509 certificates and formatted according to the S/MIME standard. X.509 is a standard of the International Telecommunications Union.

Method 1 is considered primarily as a means whereby immunization data providers may authenticate with PHC-Hub. Method 2 is the preferred means for authentication between state immunization information systems. However, either method is allowed in either situation subject to Montana law and imMTrax policy.

The sub group also recognizes that the complexity of implementing the digital signature may result in the User ID/Password method being the first deployed.

The S/MIME standard provides a structure to format messages that are digitally signed using an X.509 certificate. Encryption is an optional component of S/MIME. This standard assumes that encryption

through HTTPS or other secure channel will be used, and therefore use of the encryption facility of S/MIME is not required.

In order to use S/MIME, both the sender and the receiver must obtain X.509 digital certificates from agreed-upon Certificate Authority(s). The presentation of a message from a recognized Certificate Authority insures the identity of the sender and the integrity and non-deniability of the message. It does not, in and of itself, determine whether the sender is someone that PHC-Hub should talk to.

imMTrax uses an SSL certificate. The certificate can be found at the following websites: https://jts-test.hhs.mt.gov:8445/phchub/HL7Server (imMTrax test application) and https://js.hhs.mt.gov:8445/phchub/HL7Server (imMTrax production). Install the certificate on the server that will be sending the messages. If you need assistance with this process, contact the imMTrax office.

Transport Protocol for HL7 Messages over HTTPS using User ID/Password Authentication

When using User ID/Password Authentication, application programs will contact the IIS server by issuing an HTTP POST transaction with the following data fields:

- USERID – imMTrax assigns the user ID.
- PASSWORD –imMTrax assigns a temporary password that must be changed by the provider site. Implementations must support passwords of at least 8 characters and have a combination of letters and digits and will not allow any repeating characters. For security reasons, the password is NOT to be shared with imMTrax staff.
- MESSAGEDATA – The HL7 message as ASCII text. The message must begin with the character string "MSH".

The response content to the HTTP POST will be the appropriate HL7 message as required by *Implementation Guide for Immunization Data Transactions using Version 2.3.1 of the Health Level Seven (HL7) Standard Protocol.* The HL7 message will not be encapsulated in any way.

Transport Protocol for HL7 Messages over HTTPS using Digital Signatures

When using Digital Signatures for Authentication, application programs will contact the PHC-Hub server by issuing an HTTP POST transaction with the following data fields:

- USERNAME/PASSWORD – Each user needing HL7 upload access to PHC-Hub is given a specific user name and password. This user name and password is created in the imMTrax system as a user with this permission under the organization /site that is the sending entity. The user name and password is used to authenticate the sending system's access to PHC-Hub.
- MESSAGEDATA – The Message content will be the digitally signed HL7 message formatted in accordance S/MIME Version 2 specification available at http://www.ietf.org/rfc/rfc2311.txt.

The response content to the HTTP POST will be the appropriate HL7 message as required by *Implementation Guide for Immunization Data Transactions using Version 2.3.1 of the Health Level Seven (HL7) Standard.* Message content will be the digitally signed HL7 message formatted in accordance S/MIME Version 2.

HTTP VERSION AND RECOMMENDED HEADERS

Where possible, HTTP version 1.1 (http://www.ietf.org/rfc/rfc2616.txt) should be used for all client messages.

When HTTP messages are sent, intervening servers may cache responses to improve overall network response. Because the messages discussed here are dynamic queries and updates, cached results are likely to be incorrect or out of date. HL7 query id's should be unique and so should not be cached, but to avoid any possible interaction with caching servers, the no-cache directives should be used in all HTTP headers. In HTTP version 1.1, these take the form:

Cache-control: no-cache
In version 1.0, the equivalent is:
Pragma: no-cache

IIS SERVER LOOKUP SERVICE

Both public key infrastructure and IIS-to-IIS communication require a lookup service to link IIS with their public keys and http addresses.

Such a lookup (or directory) service should provide sufficient information to a client that the client could adequately determine the likely authoritative IIS given address information in an HL7 query message or "other previous residence" address hints.

The information returned should include addresses for the HL7 HTTP server and human technical contact, and the public key used to communicate authentication messages to the IIS.

The search information schema should include for each IIS:

- A printable name for the IIS (ex: Montana State Immunization Information System)
- The country the covered by the IIS's domain of service (ex: USA)
- The state the IIS's domain of service covers (ex: MT)
- If the IIS is not authoritative for the entire state:
  - The list of counties the IIS is authoritative for (ex: Yellowstone)
  - If the IIS is not authoritative for the entire county, or if there are cities outside the jurisdiction of any county for which the IIS is authoritative:
    - The list of cities the IIS is authoritative for (ex: Billings, MT)

The returned data for a matching IIS should include:

- The HTTP/HTTPS URL for the HL7 service
- The X509 public key for the service
- A human technical contact email address
- A human technical contact telephone

BATCH UPLOADS VIA HTTPS

When batches of HL7 messages are sent via HTTP, they should be combined according to the HL7 Batch Protocol as described in by *Implementation Guide for Immunization Data Transactions using Version 2.3.1 of the Health Level Seven (HL7) Standard Protocol.* Batch uploads use the same specifications above, except that instead of the messages starting with "MSH", batches start with "FHS".

SOAP TRANSPORT

PHC-Hub is able to accept messages that are sent using the SOAP protocol.

Example I is a message sent with PHC-Hub specific information.

EXAMPLE I


```
<soap:Envelope xmlns:soap="http://www.w3.org/2003/05/soap-envelop
   <soap:Header/>
   <soap:Body>
      <urn:submitSingleMessage>
         <!--Optional:-->
         <urn:username>josh.akin3</urn:username>
         <!--Optional:-->
         <urn:password>tnt12345</urn:password>
         <!--Optional:-->
         <urn:facilityID>14629</urn:facilityID>
         <urn:hl7Message>MSH|^~\&amp;|TMI NextGen Rosetta|MT0001
PID|1||3300.3300^^^^MR||AKINOME^BAHRAINE^^^^MS||20010101|F||2028
PD1|||^^|||||||||Y||
RXA|0|1|20130519||03^^CVX^90707^^CPT|1|1||01^New Immunization|la
RXR|ID|RA|
OBX|1|CE|30963-3^Vaccine purchased with^LN||PUBLIC^Public funds^
OBX|1|CE|VFC-STATUS^VFC Status^STC||V01^Medicaid^HL70064||||||F
      </urn:submitSingleMessage>
   </soap:Body>
</soap:Envelope>
```

Example II is a sample from the CDC's EHR-IIS Interoperability Enhancement Project: SOAP Implementation Guide[5]

EXAMPLE II

```
<?xml version="1.0" encoding="UTF-8"?>
<definitions xmlns:wsu="http://docs.oasis-open.org/wss/2004/01/oasis-200401-wss-
wssecurity-utility-1.0.xsd"
             xmlns:wsp="http://www.w3.org/ns/ws-policy"
             xmlns:wsp1_2="http://schemas.xmlsoap.org/ws/2004/09/policy"
             xmlns:wsam="http://www.w3.org/2007/05/addressing/metadata"
             xmlns:wsaw="http://www.w3.org/2005/08/addressing"
             xmlns:soap12="http://schemas.xmlsoap.org/wsdl/soap12/"
             xmlns:tns="urn:cdc:iisb:2011"
             xmlns:xsd="http://www.w3.org/2001/XMLSchema"
             xmlns="http://schemas.xmlsoap.org/wsdl/"
             targetNamespace="urn:cdc:iisb:2011"
             name="IISServiceNew">
```

[5] http://www.cdc.gov/vaccines/programs/iis/technical-guidance/SOAP/downloads/transport-specification.pdf

```
  <!-- schema for types -->
  <types>
        <xsd:schema elementFormDefault="qualified"
targetNamespace="urn:cdc:iisb:2011">

              <xsd:complexType name="connectivityTestRequestType">
                    <xsd:sequence>
                          <xsd:element name="echoBack" type="xsd:string"
minOccurs="1" maxOccurs="1" nillable="true"/>
                    </xsd:sequence>
              </xsd:complexType>

              <xsd:complexType name="connectivityTestResponseType">
                    <xsd:sequence>
                          <xsd:element name="return" type="xsd:string" minOccurs="1"
maxOccurs="1" nillable="true"/>
                    </xsd:sequence>
              </xsd:complexType>

              <xsd:complexType name="submitSingleMessageRequestType">
                    <xsd:sequence>
                          <xsd:element name="username" type="xsd:string"
minOccurs="0" maxOccurs="1" nillable="true"/>
                          <xsd:element name="password" type="xsd:string"
minOccurs="0" maxOccurs="1" nillable="true"/>
                          <xsd:element name="null" type=”xsd:string"  minOccurs="0"
maxOccurs="1" nillable="true"/>
                          <xsd:element name="hl7Message" type="xsd:string"
minOccurs="1" maxOccurs="1" nillable="true"/>
                    </xsd:sequence>
              </xsd:complexType>

              <xsd:complexType name="submitSingleMessageResponseType">
                    <xsd:sequence>
                          <xsd:element name="return" type="xsd:string" minOccurs="1"
maxOccurs="1" nillable="true"/>
                    </xsd:sequence>
              </xsd:complexType>

              <xsd:complexType name="soapFaultType">
                 <xsd:sequence>
                       <xsd:element name="Code" type="xsd:integer" minOccurs="1"/>
                       <xsd:element name="Reason" type="xsd:string" minOccurs="1"/>
                       <xsd:element name="Detail" type="xsd:string" minOccurs="1"/>
                 </xsd:sequence>
              </xsd:complexType>

              <xsd:complexType name="UnsupportedOperationFaultType">
                 <xsd:sequence>
                       <xsd:element name="Code" type="xsd:integer" minOccurs="1"/>
                       <xsd:element name="Reason" fixed="UnsupportedOperation"/>
                       <xsd:element name="Detail" type="xsd:string" minOccurs="1"/>
                 </xsd:sequence>
              </xsd:complexType>

              <xsd:complexType name="SecurityFaultType">
                 <xsd:sequence>
                       <xsd:element name="Code" type="xsd:integer" minOccurs="1"/>
                       <xsd:element name="Reason" fixed="Security"/>
                       <xsd:element name="Detail" type="xsd:string" minOccurs="1"/>
                 </xsd:sequence>
              </xsd:complexType>
```

```
            <xsd:complexType name="MessageTooLargeFaultType">
               <xsd:sequence>
                     <xsd:element name="Code" type="xsd:integer" minOccurs="1"/>
                     <xsd:element name="Reason" fixed="MessageTooLarge"/>
                     <xsd:element name="Detail" type="xsd:string" minOccurs="1"/>
               </xsd:sequence>
            </xsd:complexType>

            <xsd:element name="connectivityTest"
type="tns:connectivityTestRequestType"/>
            <xsd:element name="connectivityTestResponse"
type="tns:connectivityTestResponseType"/>
            <xsd:element name="submitSingleMessage"
type="tns:submitSingleMessageRequestType"/>
            <xsd:element name="submitSingleMessageResponse"
type="tns:submitSingleMessageResponseType"/>
            <xsd:element name="fault" type="tns:soapFaultType"/>
            <xsd:element name="UnsupportedOperationFault"
type="tns:UnsupportedOperationFaultType"/>
            <xsd:element name="SecurityFault" type="tns:SecurityFaultType"/>
            <xsd:element name="MessageTooLargeFault"
type="tns:MessageTooLargeFaultType"/>

    </xsd:schema>
  </types>

  <!-- Message definitions -->
  <message name="connectivityTest_Message">
    <documentation>connectivity test request</documentation>
    <part name="parameters" element="tns:connectivityTest" />
  </message>

  <message name="connectivityTestResponse_Message">
    <documentation>connectivity test  response</documentation>
    <part name="parameters" element="tns:connectivityTestResponse" />
  </message>

  <message name="submitSingleMessage_Message">
    <documentation>submit single message request.</documentation>
    <part name="parameters" element="tns:submitSingleMessage" />
  </message>

  <message name="submitSingleMessageResponse_Message">
    <documentation>submit single message response</documentation>
    <part name="parameters" element="tns:submitSingleMessageResponse" />
  </message>

  <message name="UnknownFault_Message">
    <part name="fault" element="tns:fault"/>
  </message>

  <message name="UnsupportedOperationFault_Message">
      <part name="fault" element="tns:UnsupportedOperationFault"/>
  </message>

  <message name="SecurityFault_Message">
    <part name="fault" element="tns:SecurityFault"/>
  </message>
  <message name="MessageTooLargeFault_Message">
    <part name="fault" element="tns:MessageTooLargeFault"/>
  </message>
```

```
  <!-- Operation/transaction declarations -->
  <portType name="IIS_PortType">
    <operation name="connectivityTest">
      <documentation>the connectivity test</documentation>
      <input message="tns:connectivityTest_Message"
wsaw:Action="urn:cdc:iisb:2011:connectivityTest"/>
      <output message="tns:connectivityTestResponse_Message"
wsaw:Action="urn:cdc:iisb:2011:connectivityTestResponse"/>
      <fault name="UnknownFault" message="tns:UnknownFault_Message"/>    <!-- a
general soap fault -->
      <fault name="UnsupportedOperationFault"
message="tns:UnsupportedOperationFault_Message"/>    <!-- The UnsupportedOperation
soap fault -->
    </operation>

    <operation name="submitSingleMessage">
      <documentation>submit single message</documentation>
      <input message="tns:submitSingleMessage_Message"
wsaw:Action="urn:cdc:iisb:2011:submitSingleMessage"/>
      <output message="tns:submitSingleMessageResponse_Message"
wsaw:Action="urn:cdc:iisb:2011:submitSingleMessageResponse"/>
      <fault name="UnknownFault" message="tns:UnknownFault_Message"/>    <!-- a
general soap fault -->
      <fault name="SecurityFault" message="tns:SecurityFault_Message"/>
      <fault name="MessageTooLargeFault" message="tns:MessageTooLargeFault_Message"/>
    </operation>
  </portType>

  <!-- SOAP 1.2 Binding -->
  <binding name="client_Binding_Soap12" type="tns:IIS_PortType">
    <soap12:binding style="document" transport="http://schemas.xmlsoap.org/soap/http"
/>
    <operation name="connectivityTest">
      <soap12:operation soapAction="urn:cdc:iisb:2011:connectivityTest" />
      <input><soap12:body use="literal" /></input>
      <output><soap12:body use="literal" /></output>
      <fault name="UnknownFault"><soap12:fault use="literal"
name="UnknownFault"/></fault>
      <fault name="UnsupportedOperationFault"><soap12:fault use="literal"
name="UnsupportedOperationFault"/></fault>
    </operation>
    <operation name="submitSingleMessage">
      <soap12:operation soapAction="urn:cdc:iisb:2011:submitSingleMessage" />
      <input><soap12:body use="literal" /></input>
```

REFERENCE IMPLEMENTATIONS

The working group proposed the creation of reference implementations demonstrating the protocols described herein. The purpose of the reference implementation is to provide examples that may be used as starting points by registry developers in implementing the protocols in this standard. The following are general principles for the reference implementations:

1. The reference implementations shall be open source.
2. The reference implementations should avoid, to the extent possible, registry-specific business logic, and should concentrate on the protocols.
3. The reference implementations should provide simple interfaces for authentication and message logging by external routines to be provided by the specific registry implementers.

APPENDIX 3 – CDC HL7 SPECIFICATION TABLES

This Appendix supplies the detailed information in the CDC HL7 Specification for each HL7 message segment. The complete CDC HL7 Implementation guide for v2.5.1 can be found at: http://www.cdc.gov/vaccines/programs/iis/technical-guidance/downloads/hl7guide-1-4-2012-08.pdf

HL7 SEGMENT STRUCTURE

Each segment consists of several fields that are separated by "|", which is the field separator character. The tables below define how each segment is structured and contain the following columns:

COLUMN	DEFINITION AND VALUES
SEQUENCE	The ordinal position of the field in the segment. Since PHC-Hub does not always use all possible fields in the HL7 standard, these are not always consecutive.
LEN	Maximum length of the field.
DT	HL7 data type of the field.
RP#	Y means the field may be repeated any number of times, an integer gives the maximum number of repetitions, and a blank means no repetition is permitted.
TBL#	Number of the table in the CDC HL7 Implementation Guide giving valid values for the field
ELEMENT NAME	HL7 name for the field

VXU MESSAGES

MSH MESSAGE SEGMENT DETAIL

The Message Header (MSH) Segment is used to define the intent, source, destination, and some specifics of the syntax of a message. The MSH segment is required. The supported fields are described below.

SEQ	LEN	DT	RP/#	TBL#	ITEM #	ELEMENT NAME
1	1	ST			00001	Field Separator
2	4	ST			00002	Encoding Characters
3	227	HD		0361	00003	Sending Application
4	227	HD		0362	00004	Sending Facility
5	227	HD		0361	00005	Receiving Application
6	227	HD		0362	00006	Receiving Facility
7	26	TS			00007	Date/Time Of Message
9	15	MSG			00009	Message Type
10	20	ST			00010	Message Control ID
11	3	PT			00011	Processing ID
12	60	VID			00012	Version ID
16	2	ID			00016	Application Acknowledgment Type

PID MESSAGE SEGMENT DETAILS

The Patient Identification (PID) Segment is used to communicate patient identification and demographic information. The PID segment is required. The supported fields are described below.

SEQ	LEN	DT	RP/#	TBL#	ITEM#	ELEMENT NAME
3	20	CX	Y		00106	Patient identifier list
5	45	XPN	Y		00108	Patient name
6	48	XPN	Y		00109	Mother's maiden name
7	8	TS			00110	Date of birth
8	1	IS		0001	00111	Sex code
9	48	XPN	Y		00112	Patient alias
10	6	CE	Y	0005	00113	Race code
11	106	XAD	Y		00114	Patient address
13	40	XTN	Y		00116	Phone number - home
15	60	CE		0296	00118	Primary language
22	6	CE	Y	0189	00125	Ethnic group code
23	60	ST			00126	Birth place
24	1	ID		0136	00127	Multiple birth indicator
25	2	NM			00128	Birth order
29	26	TS			00740	Patient death date and time
30	1	ID		0136	00741	Patient death indicator

PD1 MESSAGE SEGMENT DETAILS

The patient additional demographic segment contains demographic information that is likely to change about the patient.

SEQ	LEN	DT	RP/#	TBL#	ITEM#	ELEMENT NAME
3	90	XON	Y		00756	Patient primary facility
4	90	XCN	Y		00757	Patient primary care provider name & ID number
12	1	ID		0136	00744	Protection indicator
13	8	DT			01566	Protection Indicator effective date

NK1 MESSAGE SEGMENT DETAILS

The Next of Kin (NK1)/Associated Parties Segment contains information about the patient's next of kin and other associated or related parties. This segment is required for v2.5.1 messages. NK1-1, NK1-2 and NK1-3 are required fields. NK1-4 and NK1-5 are required but may be empty. Supported fields are described below.

In order for a next of kin record to be accepted into imMTrax both a valid last name and address must be present. Next of Kin first and last name information in the HL7 message (NK1) populates the Responsible person first and last name in imMTrax.

SEQ	LEN	DT	RP/#	TBL#	ITEM#	ELEMENT NAME
2	45	XPN	Y		00191	Name
3	60	CE		0063	00192	Relationship
4	55	XAD	Y		00193	Address – Street or PO Box
5	13	XTN	Y		00194	Phone number
20	60	CE		0296	00118	Primary language
29	80	CE	Y	0222	00747	Contact reason

PV1 MESSAGE SEGMENT DETAILS

The Patient Visit (PV1) segment is used to send patient specific visit information. The PV1-20 segment is used for patient financial information. For immunization messages, the patient's VFC eligibility information is sent in this field in v2.3.1 messages.
PV1-20 is the only field PHC-Hub expects of the PV1sub-segments

In v2.5.1 messages PV1-20 can no longer be sent. The patient level VFC eligibility information must be sent in an OBX segment. OBX segment details are discussed later in this Appendix.

SEQ	LEN	DT	RP/#	TBL#	ITEM#	ELEMENT NAME
1	4	SI			00131	SET ID – PV1
2	1	IS		0004	00132	Patient Class
7	60	XCN	Y	0010	00137	Attending doctor

8	60	XCN	Y	0010	00138	Referring doctor
10	3	IS		0069	00140	Hospital service
18	2	IS			00148	Patient Type
20	8	FC	Y	0064	00150	Financial Class/VFC eligibility code

ORC MESSAGE SEGMENT DETAILS

The Common Order segment (ORC) is used to transmit fields that are common to all orders (all types of services that are requested). While not all immunizations recorded in an immunization message are able to be associated with an order, each RXA must be associated with one ORC-1 segment, based on the HL7 2.5.1 standard. HL7 2.3.1 messages do not require an ORC segment.

The inbound interface will process the ORC-12 segment data. If other ORC segments are sent PHC-Hub will ignore them.

SEQ	LEN	DT	RP/#	TBL#	ITEM#	ELEMENT NAME
12	80	XCN			00226	Ordering Provider

RXA MESSAGE SEGMENT DETAILS

The Pharmacy/Treatment Administration (RXA) segment carries pharmacy administration data. It is a repeating segment in the VXU message and can record an unlimited number of vaccinations. The RXA segment is required. The required fields for v2.5.1 are RXA-1, RXA-2, RXA-3, RXA-5, and RXA-6. The fields that are required but may be empty are RXA-4, RXA-10, RXA-11, RXA-20 and RXA-21. The supported fields are described below.

SEQ	LEN	DT	RP/#	TBL#	ITEM#	ELEMENT NAME
2	4	NM			00344	Administration sub-ID counter
3	26	TS			00345	Date/time start of administration
5	100	CE		0292	00347	Administered code
6	20	NM			00348	Administered amount
7	60	CE			00349	Administered units
9	200	CE	Y		00351	Administration notes
10	68	XCN	Y		00352	Administering provider
11	200	CM			00353	Administered-at location
15	30	ST	Y		01129	Substance lot number
16	26	TS	Y		01130	Substance expiration date
17	60	CE	Y	0227	01131	Substance manufacturer name
17	4		Y		01131	Substance manufacturer code (MVX)
18	200	CE	Y		01136	Substance refusal reason
19	200	CE	Y		01123	Indication
20	2	ID		0322	01223	Completion status

21	2	ID		0323	01224	Action code-RXA
22	26	TS			01225	System entry date/time

RXR MESSAGE SEGMENT DETAILS

The Pharmacy/Treatment Route (RXR) Segment contains the actual route and site used for immunizations. RXR-1 (Route) is required for v2.5.1 messages. If this segment is supplied it should be paired with and immediately follow the corresponding RXA segment for the same immunization. PHC-Hub supports both vaccination site and route information.

SEQ	LEN	DT	RP/#	TBL#	ITEM#	ELEMENT NAME
1	60	CE		0162	00309	Administration route name
1	2				00309	Administration route code
2	60	CE		0163	00310	Administration site
2	2				00310	Administration site code

OBX MESSAGE SEGMENT DETAILS

The Observation/Result (OBX) Segment is used to transmit an observation or observation fragment. For immunization data, the segment can be used to report patient VFC eligibility status, vaccine public/private funding source, VIS Publication Dates, the date the VIS was presented to the patient or the parent and vaccine CVX codes. The OBX segment is optional in PHC-Hub for v2.3.1 messages. OBX is required for patient level VFC eligibility information in v2.5.1 messages. When present, the fields identified below are supported.

SEQ	LEN	DT	RP/#	TBL#	ITEM#	ELEMENT NAME
1	4	SI			00569	Set ID – OBX
2	2	ID		0125	00570	Value Type
3	250	CE			00571	Observation Identifier
4	20	ST			00572	Observation Sub-ID
5	99999[6]	varies	Y[7]		00573	Observation Value
6	250	CE			00574	Units
8	5	IS	Y	0078	00576	Abnormal Flags
11	1	ID		0085	00579	Observation Result Status
14	26	TS			00582	Date/Time of the Observation

The OBX identifiers used to signify what content is expected in the particular OBX segment are as follows:

[6] The length of the observation field is variable, depending upon value type. See *OBX-2 value type*.

[7] May repeat for multipart, single answer results with appropriate data types, e.g., CE, TX, and FT data types.

OBX IDENTIFIER #	DESCRIPTION
64994-7	Vaccine funding Program eligibility category
30963-3	Vaccine funding source
29768-9	VIS publication date
69764-9	Document type that the statement provides information about, e.g. barcode
30956-7	Vaccine type that the VIS statement provided information about
38890-0	Vaccine component type such as “unspecified.”
29769-7	Date the document was presented to the patient or responsible person
30945-0	Contraindication
30946-8	Vaccination contraindication/precaution effective data.
30944-3	Vaccination temporary contraindication/precaution expiration date
31044-1	Reaction to vaccination
59784-9	Disease with presumed immunity
59784-6	Indications to immunize
30973-2	Dose number in series
30979-9	Vaccines due next

ACKNOWLEGEMENT MESSAGES

MSA - MESSAGE ACKNOWLEDGMENT SEGMENT

The MSA segment is used to identify the other HL7 message being acknowledged and to specify the acknowledgement status.

SEQ	LEN	DT	R/O	RP/#	TBL#	ITEM#	ELEMENT NAME
1	2	ID	R		0008	00018	Acknowledgment code
2	20	ST	R			00010	Message control ID
3	80	ST	O			00020	Text message
4	15	NM	O			00021	Expected sequence number
5	1	ID	B		0102	00022	Delayed acknowledgment type
6	100	CE	O			00023	Error condition

ERR - ERROR SEGMENT

This segment is used to add error comments to acknowledgment messages. If the message was rejected for functional reasons, this segment will locate the error and describe it using locally established codes. Only the first fatal error is reported.

SEQ	LEN	DT	R/O	RP/#	TBL#	ITEM#	ELEMENT NAME
1	80	CM	R	Y	0357	00024	Error code and location

APPENDIX 4 – EXAMPLE HL7 MESSAGES

V2.3.1 HL7 MESSAGE WITH OBX SEGMENTS

MSH|^~\&|VALLEYCLINIC^^^|MA0000||PHC-HUB^^^|19970901||VXU^V04|19970522MA53|P|2.3.1^^^|||NE|AL|
PID|||1234^^^^SR^~1234-12^^^^LR^~3872^^^^MR~221345671^^^^SS^~430078856^^^^MA^||KENNEDY^JOHN^FITZGERALD^JR^^^L|BOUVIER^^^^^^M|19900607|M|KENNEDY^BABYBOY^^^^^^B| 2106-3^WHITE^HL70005|123 MAIN ST^APT 3B^LEXINGTON^MA^00210^^M^MSA CODE^MA034~345 ELM ST^^BOSTON^MA^00314^^BDL~^^^^^^BR^^MA002||(617)555-1212^PRN^PH^^^617^5551212^^||EN^ENGLISH^HL70296^^^|||||||N^NOT HISPANIC OR LATINO^HL70189^2186-5^NOT HISPANIC OR LATINO^CDCRE1|CHILDREN'S HOSPITAL|
PD1|||CHILDREN'S CLINIC ^L^1234^^^^FI^LEXINGTON HOSPITAL&5678&XX|12345^WELBY^MARCUS^^^DR^MD^^^L^^^DN|||||||03^REMINDER/RECALL - NO CALLS^HL70215|Y|19900607|||A|19900607|19900607|
NK1|1|KENNEDY^JACQUELINE^LEE|MTH^MOTHER^HL70063|||||||||||||||||||||||||||||898666725^^^^SS|
PV1||R|||||||||||||A|||V02^19900607~H02^19900607|
RXA|0|1|19900607|19900607|08^HEPB-PEDIATRIC/ADOLESCENT^CVX^90744^HEPB-PEDATRIC/ADOLESCENT^CPT|.5|ML^^ISO+||00^NEW ^NIP0001|^JONES^LISA|^^^CHILDREN'S HOSPITAL||5|MCG^^ISO+|MRK12345|199206|MSD^MERCK^MVX|
RXR|IM^INTRAMUSCULAR^HL70162|LT^LEFT THIGH^HL70163
OBX|1|CE|30963-3^Vaccine purchased with^LN||PBF^Public funds^NIP008||||||F|||20100920
OBX|2|CE|VFC-STATUS^VFC Status^STC||V02^Medicaid^HL70064||||||F|||19900607
OBX|3|TS|29768-9^DATE VACCINE INFORMATION STATEMENT PUBLISHED^LN|1|20080101||||||F|||19900607
OBX|4|TS|29769-7^DATE VACCINE INFORMATION STATEMENT PRESENTED ^LN|1|19900607||||||F|||19900607

The example above shows the essentials of what a message looks like. In this example, a message is being sent on behalf of Valley Clinic to PHC-Hub consisting of eight segments. NOTE: Valley Clinic may or may not be the actual immunization provider but rather the entity or organization that is transmitting the message.

- The Message Header segment (**MSH**) identifies the owner of the information being sent (**VALLEY CLINIC**) and receiver (PHC-Hub) and identifies the message as being of type **VXU (**Unsolicited Vaccination Record Update), one of the message types defined by HL7. The "P' shows that it is being sent to the Production System and that the message is in v2.3.1 (2.3.1^^^). It also shows that a response message should always (AL) be returned to the sending system
- The Patient Identification segment (**PID**) gives the client's name (JOHN FITZGERALD KENNEDY JR.), birth date (1990607, in YYYYMMDD format), and other identifying fields.
- The **PD1** segment identifies the patient's primary care provider location and the physician. This is the patient's medical home vs. the place where he was vaccinated. Frequently they are the same location. In this example this medical home is Children's Clinic and his provider is Marcus Welby, MD. PD1-12 shows that the imMTrax consent has been signed (PD1-12 = Y).

- The **NK1** segment identifies the patient's Next of Kin information. This shows that John's Mother is Jacqueline Lee Kennedy whose SSN is 898666725.
- The **PV1** segment shows that John qualified for the Vaccines for Children's Program because he is on Medicaid (V02)
- The Pharmacy Administration segment (**RXA**) tells that a Hepatitis B vaccine, with CPT code 90744, and CVX code 08 was administered ("00 NEW) on June 7, 1992 (formatted as 19970903) at the Children's Hospital. The vaccine lot number is MRK12345 and the vaccine manufacturer is Merck (MVX code MSD)
- The **RXR** segment describes the site and route used for the vaccine administration. Here the vaccination was given intramuscularly in the Left Thigh.
- There can be multiple OBX segments as shown in this example. Each OBX segment is numbered and indicates by the LOINC code what the field is being used to describe. In this example, OBX 1 contains information about what funding source was used to purchase this vaccine. Here it was provided by public funds (PBF^Public funds). The OBX code used (30963-3) indicates the information contained here is about vaccine funding source.

Many fields are optional, and this example could have included more information. Some segments may be repeated within a single message. In this example, the message could have included a second RXA segment to record another immunization given.

To follow is a version of an HL7 message with the minimum fields that will import into imMTrax in v2.3.1

V2.3.1 HL7 MESSAGE WITH THE MINIMUM REQUIRED FIELDS

MSH|^~\&|VALLEYCLINIC^^^|MA0000||IMMTRAX^^^|19970901||VXU^V04|19970522MA53|P|2.3.1^^^|||NE|AL|
PID|||3872^^^^MR||KENNEDY^JOHN^FITZGERALD^JR^^^L|BOUVIER^^^^^^M|19900607|M|||123 MAIN ST^APT 3B^LEXINGTON^MA^00210||(617)555-1212^^^|||||||||CHILDREN'S HOSPITAL|
PD1|||CHILDREN'S CLINIC ^L^1234 ||||||||Y|19900607||||||
NK1|1|KENNEDY^JACQUELINE^LEE|MTH^MOTHER^ ||||||||||||||||||||||||||||
PV1||R|||||||||||||||V02|
RXA|0|1|19900607|19900607|08^HEPB-PEDIATRIC/ADOLESCENT^CVX^90744^HEPB-PEDATRIC/ADOLESCENT^CPT||||00^NEW ^NIP0001||^^^CHILDREN'S HOSPITAL||||MRK12345|199206|MSD^MERCK^MVX|

V2.5.1 HL7 MESSAGE WITH OBX SEGMENTS

MSH|^~\&|MYEHR|DCS|||20090531145259||VXU^V04^VXU_V04|3533469|P|2.5.1||||AL<CR>
PID|1||432155^^^DCS^MR||Patient^Johnny^New^^^^L||20090414150308|M|||123 Any St^^Somewhere^WI^54000^^L<CR>
PD1||||||||||||N|20090531<CR>
NK1|1|Patient^Sally|MTH^mother^HL70063|123 Any St^^Somewhere^WI^54000^^L<CR>
ORC|RE||197023^DCS|||||||^Clerk^Myron|||||||DCS^Dabig Clinical System^StateIIS<CR>
RXA|0|1|20090415132511|20090415132511|31^Hep B Peds NOS^CVX|999|||01^historical record^NIP0001|||||||| <CR>
ORC|RE||197027^DCS|||||||^Clerk^Myron||^Pediatric^MARY^^^^^^^L^^^^^^ ^^^^^MD<CR>

RXA|0|1|20090531132511|20090531132511|48^HIB PRP-T^CVX|999|||00^new immunization record^NIP0001|
^Sticker^Nurse|^^^DCS_DC||||33k2a||PMC^sanofi^MVX<CR>
RXR|C28161^IM^NCIT^IM^IM^HL70162|<CR>
ORC|RE||197028^DCS|||||||^Clerk^Myron||^Pediatric^MARY^^^^^^^L^^^^^^^^^^^MD<CR>
RXA|0|1|20090531132511|20090531132511|110^DTAP-Hep B-IPV^CVX|999|||00^new immunization record^NIP0001|^Sticker^Nurse|^^^DCS_DC||||xy3939||SKB^GSK^MVX<CR>
RXR|IM^IM^HL70162^C28161^IM^NCIT|<CR>
OBX|1|CE|30963-3^Vaccine purchased with^LN||PBF^Public funds^NIP008||||||F|||20090531
OBX|2|CE|64994-7^VFC-STATUS^VFC Status^LN||V02^Medicaid^HL70064||||||F|||20090531
OBX|3|TS|29768-9^Date Vaccine Information Statement Published^LN|1|20080101||||||F|||20090531
OBX|4|TS|29769-7^Date Vaccine Information Statement Vaccine Information Statement Presented^LN|1|20090531||||||F|||20090531

Note: **PD1-12 =N. In v2.5.1 messages the N = sharing the record is allowed.**

To follow is a version of an HL7 message with the minimum fields that will import into imMTrax in v2.5.1

V2.5.1 HL7 MESSAGE WITH THE MINIMUM REQUIRED FIELDS

MSH|^~\&|MYEHR|DCS|||20090531145259||VXU^V04^VXU_V04|3533469|P|2.5.1||||AL<CR>
PID|1||432155^^^DCS^MR||Patient^Johnny^New^^^^L||20090414150308|M|||123 Any St^^Somewhere^WI^54000^^L<CR>
PD1||||||||||||N|20090531<CR>
NK1|1|Patient^Sally|MTH^mother^HL70063|123 Any St^^Somewhere^WI^54000^^L<CR>
RXA|0|1|20090415132511|20090415132511|31^Hep B Peds NOS^CVX|999|||01^historical record^NIP0001|||||||| <CR>
ORC|RE||197028^DCS|||||||^Clerk^Myron||^Pediatric^MARY^^^^^^^L^^^^^^^^^^^MD<CR>
RXA|0|1|20090531132511|20090531132511|48^HIB PRP-T^CVX|999|||00^new immunization record^NIP0001|
|||||33k2a||PMC^Sanofi Pasteur^MVX<CR>
ORC|RE||197028^DCS|||||||^Clerk^Myron||^Pediatric^MARY^^^^^^^L^^^^^^^^^^^MD<CR>
OBX|1|CE|64994-7^VFC-STATUS^VFC Status^LN||V02^Medicaid^HL70064||||||F|||20090531

APPENDIX 5 – IMMTRAX CONSENT

Montana requires patients to "consent" to sharing their information with imMTrax (Montana's State Immunization Information System). Consent authorizes the sharing of immunization data with medical personnel, public health personnel, as well as with non-medical personnel with a need to know, such as schools and child care providers, who must ensure that children are in compliance with State immunization requirements.

When a patient receives a vaccination from a Montana medical provider or other authorized vaccinating entity, the patient (or legal guardian) is to be provided the State Consent Form. The clinical staff should record if the patient gave consent to share their information with imMTrax or not in their EHR.

When building an interface with imMTrax, there are consent options. Let's take a look at some of the facts and ask some questions to get the right fit for your facility and imMTrax.

Montana requires consent and it is recorded in the HL7 PD1-12 field. The suggested default value for this field is null ("") to indicate that consent has not yet been requested or received and is sent to imMTrax as "consent undetermined". This will ensure that the information cannot be viewed by an end user until consent is obtained.

While the suggested default value is null to indicate "undetermined" it is important to determine the answer the following questions and every system is different:

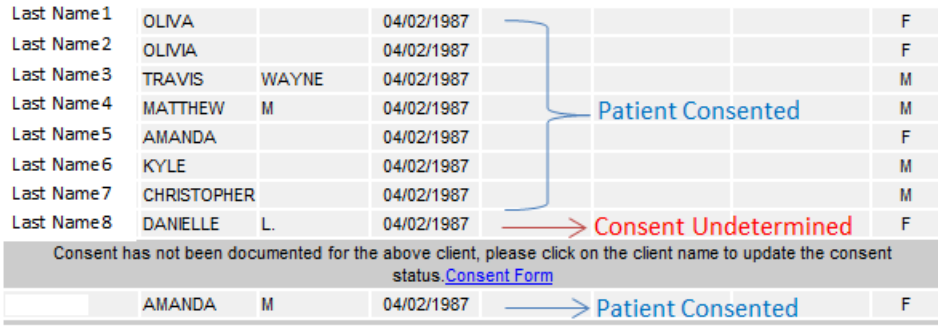
- Will the EHR send a message if the consent is marked "no" or "undetermined"?
- How and when is consent captured by the clinical staff i.e. before or after the record-sending trigger such as closing of a record?
- What version of HL7 messaging is the EHR using to submit messages?

The version number is seen in the MSH-12 segment. .

1) For HL7 2.3.1 version the value in PD1-12 the Y and N values are defined as:
   a) "Y" = sharing is allowed
   b) "N" = sharing is not allowed
2) For HL7 2.5.1 version the value in PD1-12 the Y and N values are defined as:
   a) "Y" = sharing has been denied
   b) "N" = sharing is allowed

- The PD1-13 field is the effective date for the consent value reported in PD1-12 was collected. This is a required field.

- Patient vaccine information can be received if the value in PD1-12 is "undetermined." In this case the patient vaccination information is then **viewable** only after consent has been given and entered into the system. The graphic of the imMTrax registry below details how a patient's immunizations can be viewed by clicking on the patient's name except for the patient marked as "Consent Undetermined.".



- If a patient "opts out" and consent is denied, none of the information sent in the HL7 message will be processed by imMTrax.

APPENDIX 6 – IMMTRAX CONNECTIVITY CHECKLIST

From time to time Electronic Health Record (EHR) vendors or providers have issues connecting to the *imMTrax* system to successfully send HL7 messages. This checklist is provided to assist you in troubleshooting the typical issues that occur. If you are still unable to connect, please contact *imMTrax* at 406-444-5580.

Item	Notes
URL	
☐ URL address must be correct	The URL for *imMTrax* test is: *https://jts-test.hhs.mt.gov:8445/phchub/HL7Server* The URL for *imMTrax* production is: *https://js.hhs.mt.gov:8445/phchub/HL7Server* NOTE: the url is https – not http After testing is finished you will be given the URL for the production server. The interface will need to point the production server for data to import there. The interface does NOT have to be reconfigured at that time – only the URL, user name and password will change.
☐ URL is case sensitive	"HL" and the "S" in server must be capitalized
☐ URL has no spaces	The URL address has no spaces between any of the characters. It will not work if entered with spaces anywhere in the address
USER NAME and PASSWORD	
☐ The user name must be correct	*imMTrax* provides a user name for the test and the production system. These will be different. Frequently letters get transposed causing the interface to fail. It must be entered exactly as it is provided from *imMTrax.*
☐ The user name is case sensitive	The user name is created by *imMTrax* and provided to you. User names are typically all lower case and all letters.
☐ The user name has no spaces	User names are all one word.
☐ The password must be correct	*imMTrax* provides a password for the test and the production system. These will be different. Frequently letters get transposed causing the interface to fail. It must be entered exactly as it is provided from *imMTrax*.
☐ The password is case sensitive	The password is created by *imMTrax* and provided to you. User names are typically a combination of upper and lower case letters. It may contain numbers. It will be at least 8 characters long.
☐ The password has no spaces	Passwords are all one set of characters with no spaces in between.
☐ Ensure the	UTF-8 or any other non-standard URL encoding may not be used to send messages to

required URL encoding is used	*imMTrax*
☐ Send message via HTTPS or HTTP POST	*imMTrax* only accepts messages via HTTPS or HTTP Post. If the EHR cannot send HL7 messages, *imMTrax* and send you their HL7 Gateway program and help you install it if needed. The HL7 Gateway is a small application that is installed on the server that the message will be sent from. The server must have the latest version of JAVA running and be running a 64 bit environment.
HL7 GATEWAY	
☐ Using the HL7 Gateway with a UNIX server	Load the certificate into a keystore. Copy the certificate into the UNIX box and drop it in the <hl7bridge root>/keystore directory. Then ensure that the following properties in hl7bridge.config are set as follows: hl7bridge.cert.keystore=<hl7bridge root>/keystore/cacerts hl7bridge.cert.password=changeit Replace "<hl7bridge root>" with the actual path
☐ No messages are going through the HL7 Gateway	Check that the HL7 Gateway is running. Sometimes that HL7 Gateway goes down when other systems are interrupted like when an EHR upgrade occurs. If it is not running, just restart the Gateway.
HL7 MESSAGE	
☐ Incorrect facility ID	*imMTrax* needs the HL7 message to contain the facility ID in PD1.3 or RXA-11-4. This facility ID must be unique to the location where the vaccine was administered. This ID either needs to be the ID number that *imMTrax* uses to identify the site. If the sending application uses their ID it must be mapped to the *imMTrax* ID to allow the message to import correctly. This mapping is done in PHC-Hub.
☐ MSH Segment is malformed	The MSH-1 segment is frequently malformed. It must be sent in the order displayed in the highlighted example below: MSH|^~\&||MA0000||GA0000|19970901||VXU^V04|19970522MA53|P|2.3.1|||NE|AL|
☐ Return response not in the inbound message	The inbound message can define how you want to receive responses. MSH-16 segment should be populated with AL(as highlighted in the example below) to always receive an ACK or an ERROR message in return. MSH|^~\&||MA0000||GA0000|19970901||VXU^V04|19970522MA53|P|2.3.1|||NE|AL|
☐ MSH-11 field must always be set to P	MSH-11field must always be populated with "P" whether you are sending data to the *imMTrax* test or production URL.
CERTIFICATE ERROR	
☐ *imMTrax* certificate	The Montana Immunization Program has a PHC-Hub security certificate. The provider's vendor or information technology support person may need information

	about the certificate so that they can set their system to recognize PHC-Hub's certificate (install the certificate). Once these settings are complete the EHR will accept the PHC-Hub certificate and then be able to send their messages to the PHC-Hub web servlet. Information on the PHC-Hub certificate can be obtained by contacting MT immunization program staff at (406) 444-5580

APPENDIX 7 - IMMTRAX HL7 DATA FIELD REQUIREMENTS

To follow are the imMTrax HL7 data field requirements. Each segment will be marked with one of the following values:
Required – Must be populated 100% of the time with accepted values

Recommended - These fields are highly desirable to uniquely identify the patient or some other important function

Conditional - This field may be required under certain conditions. These conditions will be specified in the comments section

Optional – May be sent but it is not required by imMTrax at this time

Table 1.1 imMTrax Field Requirements

FIELD	HL7 MSG. SEGMENT	IMMTRAX REQUIREMENT	CDC REQUIREMENT	COMMENT
MESSAGE HEADER				
Field Separator ("|")	MSH-1	Required	Required	
Encoding Character ("^~\&")	MSH-2	Required	Required	
Sending Application	MSH-3	Required	Optional	
Sending Facility	MSH-4	Required	Optional	May send internal ID number or use the imMTrax Organization ID that is supplied by imMTrax
Receiving Application	MSH-5	Required	Optional	
Receiving Facility	MSH-6	Required	Optional	
Date/Time of Message	MSH-7	Required	Required	YYYYMMDD or YYYYMMDDHHMM format
Message Type	MSH-9	Required	Required	

FIELD	HL7 MSG. SEGMENT	IMMTRAX REQUIREMENT	CDC REQUIREMENT	COMMENT
Message Control ID	MSH-10	Required	Required	
Processing ID	MSH-11	Required	Required	
Version ID	MSH-12	Required	Required	v2.31. or v2.5.1
Application Acknowledgment Type	MSH-16	Optional	RE	If the HL7 message is not set to AL, imMTrax will set it as the default in PHC-Hub
NEXT OF KIN/GUARDIAN FIELDS				
First Name	NK1-2	Conditional (Required for v2.5.1)	Optional	Required if patient is under 19 years old. Guarantor data may be used in lieu of guardian fields if they information populated there represents the patient's legal guardian ; This field must accompany the guardian's Last Name
Last Name	NK1-2	Conditional (Required for v2.5.1)	Optional	Required if patient is under 19 years old. Guarantor data may be used in lieu of guardian fields if they information populated there represents the patient's legal guardian ; This field must accompany the guardian's First Name
Middle Name	NK1-2	Optional	Optional	Do NOT send a "." after a middle initial
Relationship	NK1-3	Conditional (Required for v2.5.1)	Optional	Required if patient is under 19 years old. Describes the relationship of the guardian to the patient.
Guardian Address	NK1-4	Recommended	Optional	Street or PO Box, City, State and Zip
Phone	NK1-5	Recommended	Optional	Numerical only; Do NOT send

FIELD	HL7 MSG. SEGMENT	IMMTRAX REQUIREMENT	CDC REQUIREMENT	COMMENT
				repetitive numbers such as 9999999999
Primary Language	NK1-20	Optional	Optional	Accepted values: EN English ES Spanish BLU Hmong SO Somali FR French
Contact Reason	NK1-29	Optional	Optional	Identifies next of kin who is responsible for the patient's care, e.g. Reminder/ Recall notices
PATIENT INFORMATION FIELDS				
Patient Birth File Number	PID-3	Optional	Required	
Medicaid Number	PID-3	Optional	Required	If this value is sent it is stored in imMTrax
Patient Medical Record Number (External Id)	PID-3	Required	Optional	This is the patient unique identifier used at the sending entity. The actual number sent in the HL7 message can be the patient Medical Record Number, the Patient ID number or the Chart number. The code "MR" should be sent with the number. PID|||1234^^^^SR^~1234-12^^^^LR^~3872^^^^MR~221345671^^^^SS^~430078856^^^^MA^||KENNEDY^JOHN^FITZGERALD^JR^^^L|BOUVIER^^^^^^M|19900607|M|KENNEDY^BABYBOY^^^^^^B| 2106-3^WHITE^HL70005|123 MAIN ST^APT 3B^LEXINGTON^MA^00210^^M^MSA CODE^MA034~345 ELM ST^^BOSTON^MA^00314^^BDL~^^^^^^BR^^MA002||(617)555-1212^PRN^PH^^^617^5551212^^||EN^ENGLISH^HL70296^^^||||||N^NOT HISPANIC OR

FIELD	HL7 MSG. SEGMENT	IMMTRAX REQUIREMENT	CDC REQUIREMENT	COMMENT
				LATINO^HL70189^2186-5^NOT HISPANIC OR LATINO^CDCRE1|CHILDREN'S HOSPITAL| MR or MRN is expected behind the number
Patient First Name	PID-5	Required	Optional	Alpha characters only
Patient Middle Name	PID-5	Recommended	Optional	Alpha characters only; Do NOT include a "." after a middle initial
Patient Last Name	PID-5	Required	Optional	Alpha characters only;
Patient Name Suffix	PID-5	Optional	Optional	Alpha characters only; No symbols or punctuation. Do NOT include a period after the letters
Mother's Maiden Name	PID-6	Recommended	Optional	Used for deduplication; Alpha characters only
Patient Birth Date	PID-7	Required	Optional	YYYYMMDD format; Numerical characters only
Patient Gender	PID-8	Required	Optional	
Patient Alias	PID-9	Optional	Optional	
Patient Race	PID-10	Recommended	Optional	
Patient Address Street1	PID-11	Required	Optional	Alphanumeric
Patient Address Street2	PID-11	Optional	Optional	Alphanumeric
Patient Address City	PID-11	Required	Optional	Alpha characters only
Patient Address State	PID-11	Required	Optional	Alpha characters only
Patient Address Zip	PID-11	Required	Optional	Numerical characters only

FIELD	HL7 MSG. SEGMENT	IMMTRAX REQUIREMENT	CDC REQUIREMENT	COMMENT
Email	PID-13	Recommended	Optional	xxxxxxxxxxx@xxxxx.xxx; "_" or "." Can be sent in the email name
Phone Number	PID-13	Recommended	Optional	Numerical characters only; 10 characters
Ethnicity	PID-22	Recommended	Optional	
Patient Birth Place	PID-23	Optional	Optional	
Patient Birth Multiple Indicator	PID-24	Optional	Optional	This information is helpful for deduplicating patients in imMTrax
Patient Birth Order Indicator	PID-25	Optional	Optional	This information is helpful for deduplicating patients in imMTrax
Patient Death Indicator	PID-30	Optional	Optional	This information is helpful for reminder/recall message generation.
Patient Death of Death	PID-31	Optional	Optional	This information is helpful for reminder/recall message generation.
PATIENT DATA FIELDS				
Facility Id	PD1-3	Conditional	Optional	Required unless facility ID is sent in RXA 11-4. Mapped to the imMTrax Site ID.
Facility Name	PD1-3	Required	Optional	Mapped to the imMTrax Site ID;
Physician Id Local (used by sending system)	PD1-4	Optional	Optional	Mapped to the imMTrax physician
Physician Name First	PD1-4	Optional	Optional	Alpha characters only
Physician Name	PD1-4	Optional	Optional	Alpha characters only; Do NOT

FIELD	HL7 MSG. SEGMENT	IMMTRAX REQUIREMENT	CDC REQUIREMENT	COMMENT
Last				include a "." after a middle initial
Physician Name Middle	PD1-4	Optional	Optional	Alpha characters only;
Physician Name Suffix	PD1-4	Optional	Optional	Alpha characters only; Do NOT send "." after the suffix
Protection Code	PD1-12	Recommended	Optional	Indicates if the imMTrax consent has been completed. Y = yes, N= no, null defaults to undetermined in v2.3.1 messages. In v2.5.1 messages, Y = consent has been refused, N = consent to allow data into imMTrax, Null defaults to consent undetermined in imMTrax.
Protection Code Effective Date	PD1-13	Conditional	Optional	If PD1-12 has a value, then required. Indicates date consent form was signed
PATIENT VISIT SEGMENT				
	PV1-20	Conditional		Required for 2.3.1 if VFC status is not an OBX segment. Not accepted for 2.5.1 messages

VFC Eligibility	Value
Not Eligible	V01
Medicaid	V02
Not Insured	V03
American Indian or Alaska Native	V04

FIELD	HL7 MSG. SEGMENT	IMMTRAX REQUIREMENT	CDC REQUIREMENT	COMMENT	
				Underinsured	V05
				Underinsured – state supplied	V06
VACCINATION FIELDS					
Dose	RXA-2	Optional	Required	imMTrax counts doses in a series based on vaccination date and validity of the dose.	
Vaccination Date	RXA-3	Required	Required	Must be in YYYYMMDD format.	
Vaccine Code CVX	RXA-5	Conditional	Required	Required if CPT code is not sent. Will accept CPT codes in lieu of CVX IN RXA-5	
Vaccine Code CPT	RXA-5	Conditional	Required	Required if CVX code is not sent. Both CPT and CVX codes may be sent for each vaccine.	
Vaccine Name	RXA-5	Recommended	Required	Alpha characters only	
Administered Amount	RXA-6	Recommended	Required	Value is needed if dose decrementing inventory. Expected values are 0.5 and 1.0	
Administered Unit	RXA-7	Recommended	Conditional	Value is needed if dose decrementing inventory. Expected values are cc or ml.	
Comment	RXA-9	Optional	Optional		
Historical Vaccine	RXA-9	Required	Optional	Expected values 00=new vaccine; 01 = historical	
Physician Id Local	RXA-10	Optional	Optional		
Physician Name First	RXA-10	Optional	Optional		
Physician Name	RXA-10	Optional	Optional		

FIELD	HL7 MSG. SEGMENT	IMMTRAX REQUIREMENT	CDC REQUIREMENT	COMMENT
Last				
Physician Name Middle	RXA-10	Optional	Optional	
Facility Address City	RXA-11	Optional	Conditional	
Facility Address State	RXA-11	Optional	Conditional	
Facility Address Street 1	RXA-11	Optional	Conditional	
Facility Address Street 2	RXA-11	Optional		
Facility Address Zip	RXA-11	Optional		
Facility Name	RXA-11	Conditional		Required unless specified in PD1-3. If shot is historical, this will indicate who is reporting (not administrating) immunization. Can be mapped in imMTrax
Facility Id	RXA-11	Conditional		Required unless specified in PD1-3. If shot is historical, this will indicate who is reporting (not administrating) immunization. Can be mapped in imMTrax
Vaccine Lot Number	RXA-15	Conditional	Optional	**Not required** for historical vaccine doses. Required for dose decrementing inventory.
Vaccine Expiration Date	RXA-16	Conditional	Optional	**Not required** for historical vaccine doses. Required for dose decrementing inventory. May be changed to a required field at a later time
Vaccine Manufacturer	RXA-17	Conditional	Optional	**Not required** for historical vaccine doses. Required for

FIELD	HL7 MSG. SEGMENT	IMMTRAX REQUIREMENT	CDC REQUIREMENT	COMMENT
				dose decrementing inventory.
Indication	RXA-19	Optional	Optional	Values to indicate adverse reactions.
Action Code	RXA-21	Required but empty	Optional	It is a required field but it may be empty. Indicate if the vaccination is an addition (Add), an update to an existing vaccination (Update) or the vaccination should be deleted (Delete). The values in the HL7 message are A, U or D.
System Entry Date	RXA-22	Required	Optional	Date the vaccination administration information was entered into the source system.
System Entry Time	RXA-22	Optional	Optional	Date/time the vaccination administration information was entered into the source system.
Route	RXR-1	Optional	Optional	Alpha characters only
Site	RXR-2	Optional	Optional	Alpha characters only
ADDITIONAL INFORMATION				
Vaccine funding Program eligibility category	OBX	Conditional		Required for 2.5.1 messages. Code 64994-7
Vaccine funding source	OBX	Conditional		Recommended for 2.5.1 messages. Requirement for Meaningful Use Stage 2. Code 30963-3
VIS publication date	OBX	Conditional		Recommended for 2.5.1 messages. Requirement for Meaningful Use Stage 2. Code 29768-9

FIELD	HL7 MSG. SEGMENT	IMMTRAX REQUIREMENT	CDC REQUIREMENT	COMMENT
Document type that the statement provides information about, e.g.barcode	OBX	Optional		Code 69764-9
Vaccine type that the VIS statement provided information about	OBX	Optional		Code 30956-7
Vaccine component type such as “unspecified.”	OBX	Optional		Code 38890-0
Date the document was presented to the patient or responsible person	OBX	Conditional		Recommended for 2.5.1 messages. Requirement for Meaningful Use Stage 2. Code 29769-7

<table>
<tr><th>FIELD</th><th>HL7 MSG. SEGMENT</th><th>IMMTRAX REQUIREMENT</th><th>CDC REQUIREMENT</th><th>COMMENT</th></tr>
<tr><td>Contraindication</td><td>OBX</td><td>Conditional</td><td></td><td>Recommended for 2.5.1 messages. Requirement for Meaningful Use Stage 2.

<table><tr><td>30946-8</td><td>Vaccination contraindication/precaution effective date</td></tr><tr><td>30944-3</td><td>Vaccination temporary contraindication/precaution expiration date</td></tr><tr><td>30945-0</td><td>Vaccination contraindication/precaution</td></tr><tr><td>31044-1</td><td>Reaction</td></tr><tr><td>59784-9</td><td>Disease with presumed immunity</td></tr></table></td></tr>
</table>